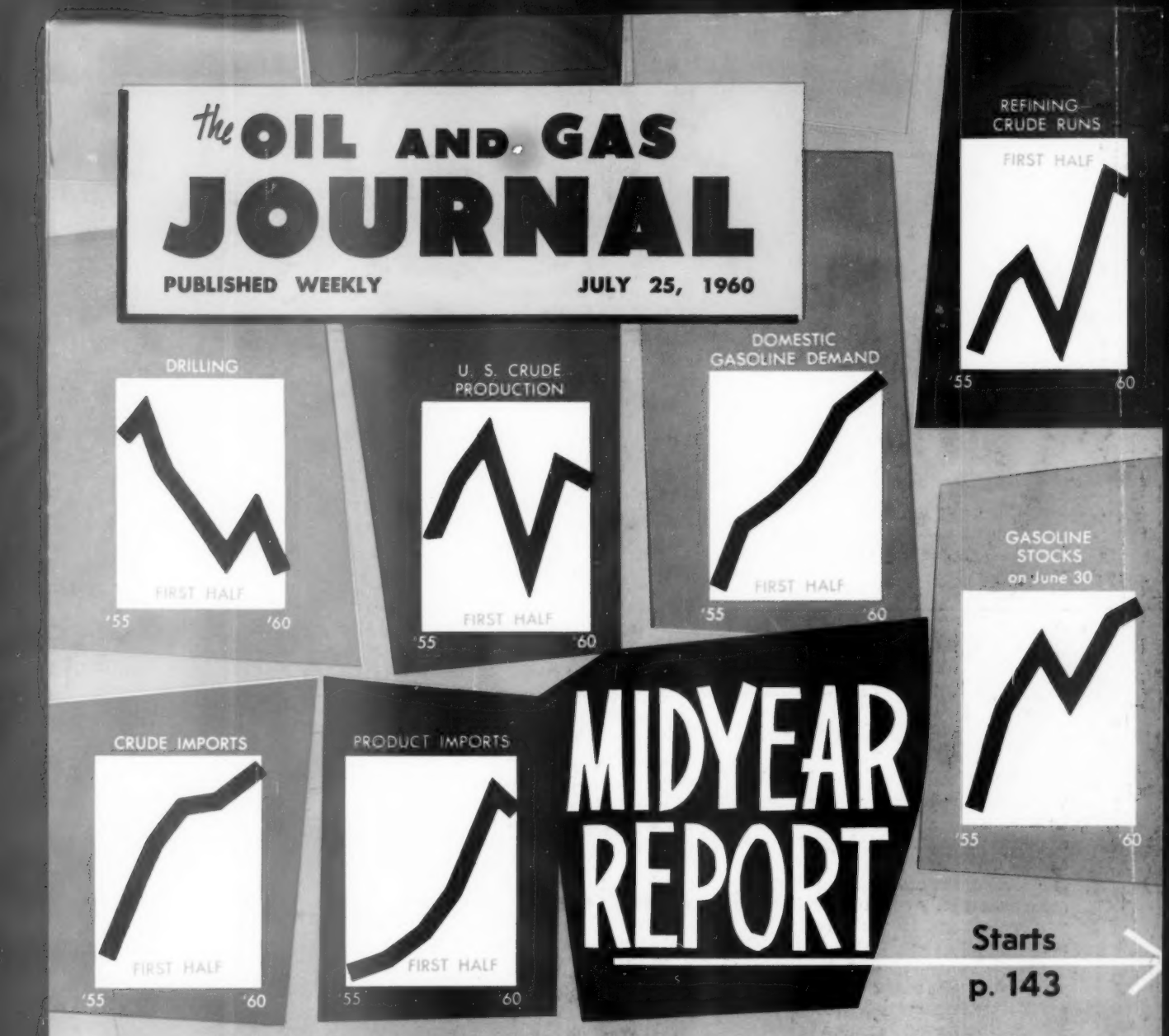
the OIL AND GAS JOURNAL

PUBLISHED WEEKLY JULY 25, 1960



MIDYEAR REPORT

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Coastal refiners staging a comeback ▸ 122

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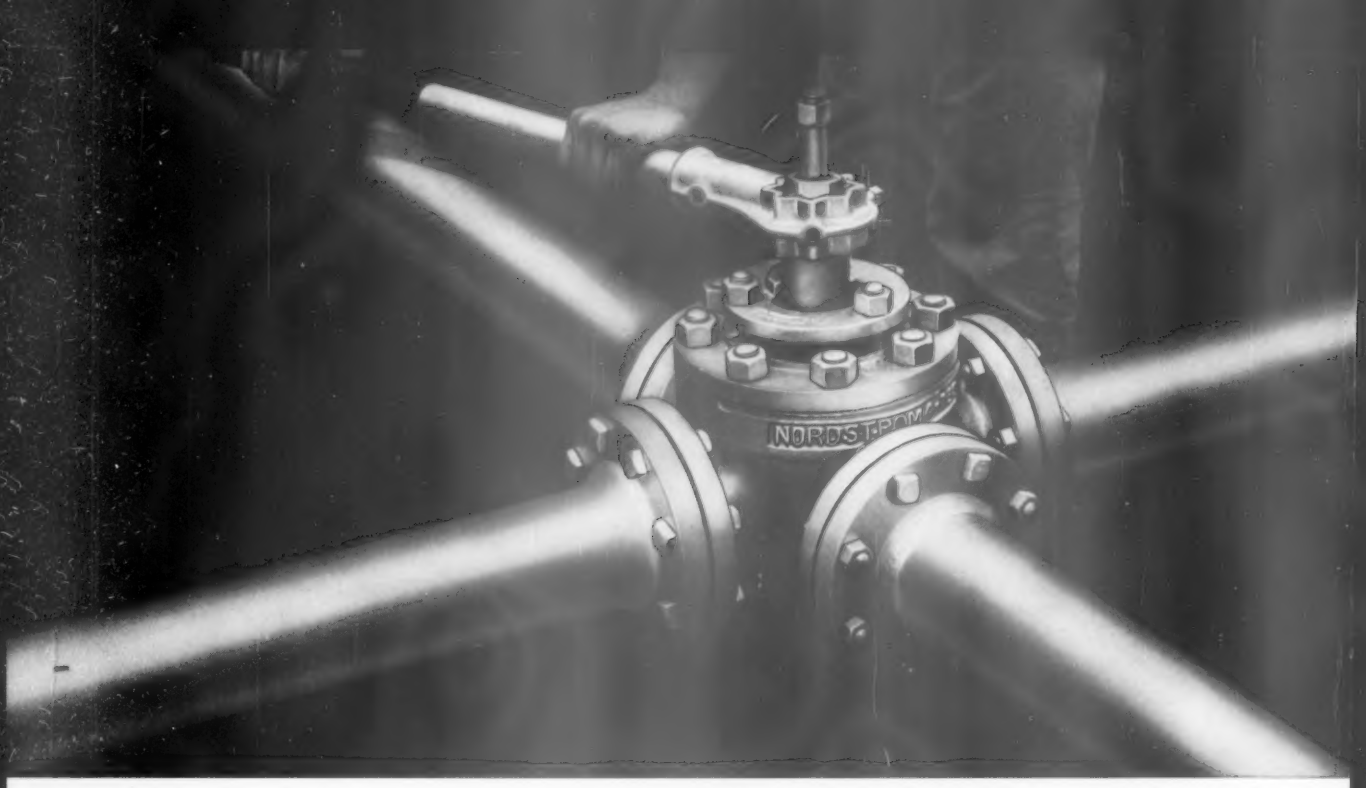
North Africa: Active from Nile to Atlantic ▸ 138



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The Oil and Gas Journal is published weekly by The Petroleum Publishing Co., 211 S. Cheyenne, Tulsa 3, Okla. Second-Class postage paid at Tulsa, Okla. Copyright 1960 by The Petroleum Publishing Co. United States and foreign rates to the petroleum industry, 1 year $5, 2 years $8, 3 years $10.

MIDYEAR REPORT

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These pages summarize some of the important oil stories of the first half of 1960.

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Drilling schedules call for 13% more wells in last half of the year than in first. Total for year is set at 45,451 wells and 196,873,000 ft.

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Crude Production Dropped 152,000 Bbl. Daily 162
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Excess Processing Capacity Plagued Refiners in First Half 164
The bulge of nearly 1.7 million barrels per day in unused capacity posed a daily temptation to run those incremental barrels.

Imports Drop from Abnormally High Record of Early 1959 166

Gas-Liquids Production Tops 39,000,000 Gal. Daily 167

Marketers Walk A Tightrope in First Half 168
Early 1960 was a nervous period of oversupply and soft prices. Vagaries of the weather kept refiners off balance in the first quarter. Prices were strengthening at midyear.

Pipelines Set for Big Second Half After Slow Start 170
This will be a big year for gas pipelines. Crude-pipeline construction remains depressed but product-line activity is up sharply from 1959.

Why Consumer Gas Prices Are High 172
Rate expert says distributors need to do a better marketing job, and pipelines need new industrial uses other than boiler fuel.

Oil Conservation in the Classroom 177
Seminar at Southern Methodist University on "Conservation Regulation in the Production of Petroleum" studied oil by considering together the mutually dependent factors of economics, engineering, law, and politics.

Plant Construction at Midyear 185
New survey on refining, field-processing, and petrochem construction shows more than 200 projects under way or planned in the United States and Canada, with more than half in petrochemicals.

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the OIL AND GAS JOURNAL Newsletter

Tulsa, Okla.
July 25, 1960

Oil will pick up some in the second half:

Demand should continue strong and with the usual seasonal pickup will give a firm undertone to industry economics.

The outlook: Total demand should rise 3.8% in third quarter and 4.6% in the fourth. Domestic demand for the last half should show a 4.4% gain over same period last year.

Result is this: A 13% gain in drilling over the first half; significant gains in production in last quarter; refinery runs to increase; and pipeline construction to hit a peak for the year (p. 120)*.

▼ ▼ ▼

Word from Washington is that oil may have more at stake in the coming election than in any since 1952.

New and young leaders are taking over in both parties.

Democrats are swinging away from more conservative approach to a new so-called liberal stand.

Big question at Chicago this week is which way the Republicans will move.

Upshot may be new leadership and sudden changes in oil's approach to its public affairs problems (p. 130).

▼ ▼ ▼

Possibilities for in situ combustion recovery of oil in the Appalachian region are being studied by the U. S. Bureau of Mines.

Reservoirs there may contain as much as 2 billion barrels of unrecovered, but possibly recoverable oil, officials of the bureau say.

Permit to conduct in situ combustion experiments in the Athabasca oil sands is sought from the Alberta Oil & Gas Conservation Board by Pan American Petroleum Corp.

The project will not be on a scale of commercial proportions but will extend over a 6 to 12-month period. Operations would get under way immediately.

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*Refers to article in this issue giving more details. Where no page is given, the item is a Newsletter exclusive.

A rig shortage pops up in Australia. More drilling projects are in the planning stage than present supply of rigs can handle. At least seven wells, and possibly more, are in store for Queensland alone.

And there's no prospect for immediate improvement. The recent discovery of commercial gas near Roma at Associated Australian Oilfields N.L., et al., has encouraged drillers about the oil future of the big continent.

The international beat:

Russia is determined to give Cuba top priority in Soviet oil shipments. A 40,000-ton supertanker has been shifted from Black Sea-Orient run to rush oil to Cuba, temporarily slowing Russia's Asian trade...Cuba, meanwhile, isn't having much luck getting ships on its own for oil or sugar hauls (p. 141).

Japanese currency exchange regulations are putting the pinch on major international companies doing business there. Unless a change is made, the trend will snowball under pressure of crude from Russia and from new Japanese production in the Persian Gulf (p. 141).

Mobil International has hit oil pay in a Turkish wildcat 40 miles inland from port city of Mersin on the Mediterranean coast. Mersin is site of 65,000-bbl. refinery now being built by Mobil-controlled group (p. 142).

Name of Dr. Humberto Penaloza crops up as possible boss of Venezuela's new national oil company following his resignation as director of economics in ministry of mines. The company is expected to start up operations this year.

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Refiners made it four in a row. They ran 8,257,000 bbl. daily of crude for the latest week. That makes four straight weeks with runs above 8,200,000 bbl. daily.

The average for the last 4 weeks is the highest summertime rate in oil history and is above the average wintertime rate for recent years.

The rough part: Stocks of four major products have gained 18,000,000 bbl. in the last 4 weeks.

Interesting development is the comeback being staged by independent refiners on the Gulf Coast after the collapse of their traditional markets and methods of operations.

Most of the refiners in the last few years have abandoned their old mainstay: Bulk cargo sales of products to major companies. This market dried up and the independents had to switch—some to retail marketing and others to wholesaling through terminals (p. 122).

Interest charge on tardy credit-card payments spreads.

Phillips will test a plan in five of its 18 sales regions to levy a 1.5% monthly charge on the unpaid balance delinquent after 50 days. Phillips experimented with idea in its St. Paul-Minneapolis area involving 30,000 retail accounts, and found very little opposition from the customers.

It's another move to shave mounting costs of the credit business for oil companies. A number of firms have been levying a 1% charge for late-pay gasoline purchasers, but most marketers still make no charge for slow-paying accounts.

Marketing people don't want the charge to give customers encouragement for drawn-out payment. They believe that paying extra for slow payment may cause buyers to keep accounts current.

Marketing notes:

Gulf plans to operate newly acquired Wilshire Oil as a West Coast marketing and refining subsidiary. It will be much like Warren, British American, and others controlled by Gulf. Still down the road is actual entry of the Gulf flag in West Coast marketing (p. 136).

Industry is going all out to make motor travel more attractive. Spearheading campaign will be a new API Travel Development Committee (p. 137).

Fuel-oil men are discovering they don't have to take a beating from the gas salesmen. Their determined efforts to get back markets lost to gas are paying off. The tools used: More promotion, better burners, and an improved product (p. 126).

Tennessee Gas is entering the petroleum retail market in Tennessee with two service stations and a terminal.

Humble has absorbed Jersey subsidiaries, Oklahoma Oil and Pate Oil, into its organization in another move toward a goal of becoming a nationwide marketer.

▼ ▼ ▼

The Pan American purchase of half interest in Texas Gas Corp. is a natural for both.

Deal puts Pan American, a large gas producer, into the intrastate gas transmission business in Texas and assures the company a gas market. Texas Gas is assured a supply (p. 136).

Outdoor electric compressor stations are planned by Texas Eastern Transmission as a cost-cutting measure.

This type of design—used on oil lines to save building costs—has not been adopted by gas-transmission lines.

Two trends to watch in pipelining:

Increasing number of jet-fuel lines to Air Force bases, and the advent of batching products in crude lines.

Market Memo

July 25, 1960

Refiners are being fatally attracted to higher-than-necessary crude runs to stills. Weaker gasoline prices in August may result.

Demand for gasoline over the long July 4th weekend cut stocks only 414,000 bbl. Reduction in same period last year was 2,237,000 bbl. Refiners during the week ended July 8, meanwhile, produced 30,677,000 bbl. of gasoline for an all-time record.

Feeling in the trade is that Gulf Coast spot gasoline prices may weaken from one-quarter to three-eighths cent off postings in August due to the high crude runs.

There's a definite lull in all markets at present.

Gulf Coast prices are steady at current postings. 92-RON gasoline is available at 11 cents per gallon posted price and No. 2 at 8.25 cents for prompt lifting...Bunker C fuel is firm at new posting of $2.30 per barrel from the Gulf...Low sulfur No. 6 is available at posted $2.45 with some refiners asking 10 cents per barrel above that figure.

Chicago gasoline prices advanced one-half cent per gallon on all grades last week. Seasonal demand is lending some strength to the new postings. Price tag for 92-RON is 12.625 cents and for 98-RON 14.75 cents...Both No. 1 and No. 2 are firm at 9.75 and 9 cents per gallon. This is one-half cent per gallon lower for each than prevailed last year in spite of less burdensome stocks.

Mid-Mississippi River offerings of gasoline are limited on a prompt spot basis. Prices range from low Gulf Coast to three-eighths cent over that figure. This puts 92-RON at 11 cents up to 11.375 cents per gallon depending on point of delivery. Middle distillates are being offered quietly in barge lots at Gulf Coast lows up to one-quarter cent over.

Group 3 prices for northern shipment on all products continue firm. And 91-RON gasoline is posted at 12 cents and 99-RON at 14.75 cents. Refiners are reluctant to push sales of No. 1 at 9 cents and No. 2 at 8, hoping for price improvement.

Notes: One refiner last week reportedly was offering gasoline on Texas Coast at one-eighth cent off a published price...Two others offered prompt cargo gasoline at the low posted...Two major buyers are in quest of more crude and are cold to pleas from refining friends to buy products instead.

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Hose that goes to blazes shouldn't blow out

At this oil refinery fire, hose lines took a terrific beating. Heavy fire trucks, tractors, even bulldozers, ran over them, crushed them. Some kinds of hose were so weakened by the pounding that they burst. But while ordinary fire hose was popping all over the place, not one length of the six thousand feet of B.F.Goodrich hose in use blew out.

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- Drum dividers
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- Different platform arrangements

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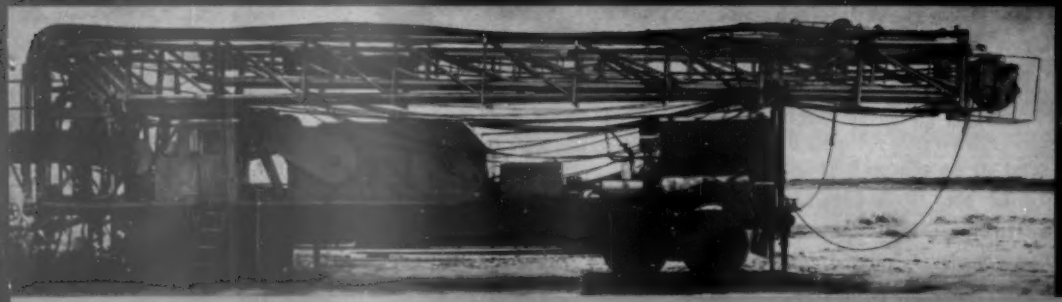

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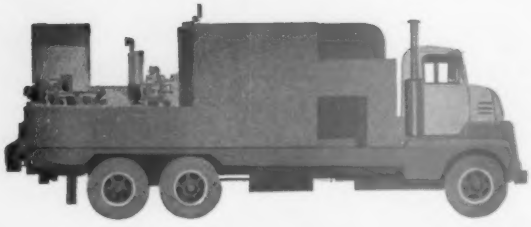

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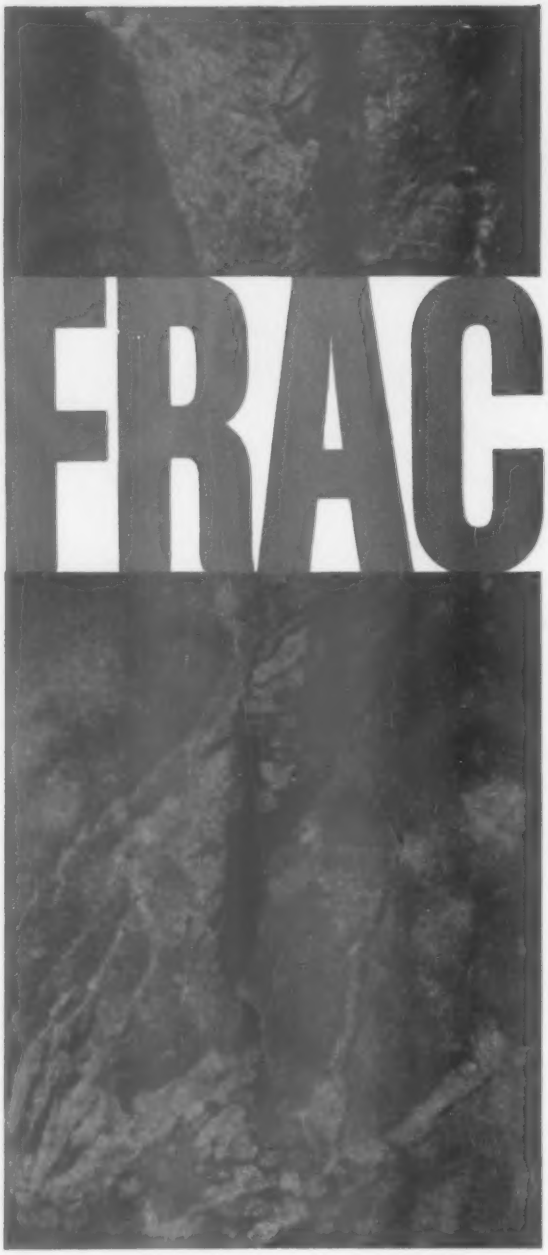

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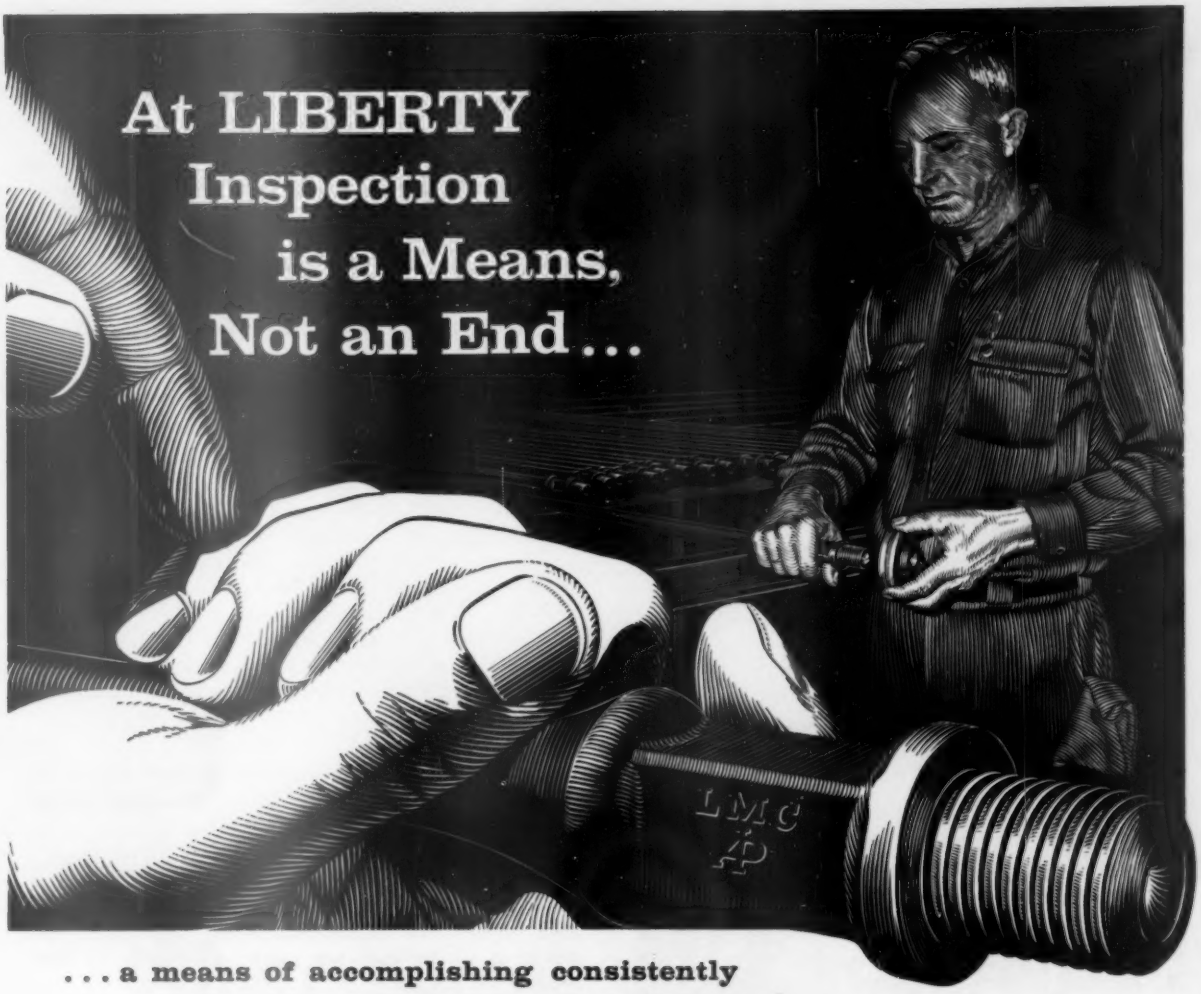

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CONTACTOR NUMBER 3

AMINE PROCESS DESIGN AND OPERATING INFORMATION

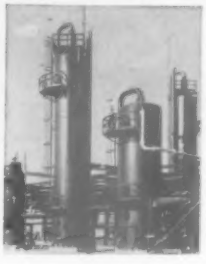
While ethanolamines are an excellent medium for treating gas, their satisfactory application depends on proper use of the amines and correct design of mechanical equipment. Some of these important design and operating considerations will be discussed in this series.

Maximum Stripping in Still is Essential

Insufficient stripping is a serious problem in amine plant operation. If all of the rich solution stripping is not done in the still, then a great deal of it will be done in the reboiler . . . causing very severe tube erosion and corrosion.

Good design calls for two or more stills in parallel to provide correct still area. Fluctuations in still loading can then be met by using one or the other. Economic considerations, however, may prevent this practice.

In cases where a plant is in operation and residual CO_2 in the lean amine goes above 1 cu. ft./gal. of solution, there are three ways to increase stripping:



1. Increase heat to the reboilers which will drive more steam up the column.

2. In a bubble cap column, alternate rows of caps can be blanked off to increase contact efficiency.

3. Increase liquid circulation. (This, however, will also increase steam consumption.)

Blanketing is Beneficial

To reduce oxidation of amine solutions and to avoid attendant corrosion problems, surge tanks, sumps and all parts of the system should be blanketed with oxygen-free gas. Wherever possible, oxygen should be excluded from the gas being treated.

When treating oxygen-containing gas, close attention to reclaimer design is necessary. The capacity of the reclaimer should be sufficient to maintain a low concentration of oxidation products.

Any amine solution which has been recovered from system leaks, and is to be returned to the system, should be returned only through the reclaimer.

Avoid Solution Overloading

Amine treating can be overdone, and any effort to dissolve too much acid gas usually results in trouble. Four cu. ft. of acid gas/gal. of solution is about the limit. Above this amount (in terms of a 15% solution of NEA), the bicarbonate or acid salt forms, aggravating corrosion by pH and CO_2 evolution effects.

Many difficulties can be attributed to improper solution loading. Exceeding the recommended amount for limited periods will not seriously damage a plant . . . providing it isn't done repeatedly.

It has been found in plant operation that it is difficult to justify using a 20% NEA solution (or higher) due to the problem of regeneration. Reference to equilibrium data in NEA literature will prove this to be true.

Low Reactivator Temperatures Reduce Corrosion

Because CO_2 and H_2S are inherently corrosive in the presence of water at elevated temperatures, amine reactivator temperatures should be kept to a minimum (235-245°F). These gases require pressures of 8-13 psig. at the base of the reactivator. Holding to this range of temperature and pressure will help in these ways:

1. It will minimize the inherent corrosiveness of the system;

2. Corrosion inhibiting films are less likely to be destroyed;

3. The possibility of thermal degradation with its accompanying increase in corrosiveness is reduced.

With other operating factors at their optimum, the recommended temperature will give good stripping of CO_2 and H_2S. Use of proper temperature will usually eliminate the need for costly alloys in heat exchangers and reboilers.

FOR MORE INFORMATION, look for the next Allied Chemical Contactor.

For specifications and local offices, see our insert in Chemicals Materials Catalog, pages 475-482, and in Chemical Week Buyers Guide, pages 37-44.

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BETHLEHEM STEEL

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Cut disconnect-reconnect time by as much as 50%

The FALK Spacer Coupling is specially designed for quick installation or removal *without disturbing the driving or driven unit.* This feature can save you up to 50% in disconnect-reconnect time when critical equipment—a process pump, for example—needs repair or replacement.

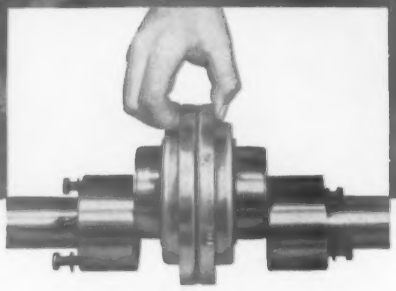
Here's another saving: with the FALK Spacer Coupling, you can quickly realign shafts *without the usual loss of operating temperature!*

And still another: you can remove or reinstall the FALK Spacer as a unit *without draining the lubricant.*

Because of its exclusive grid-groove Steelflex design, the FALK Spacer can accommodate residual misalignment—parallel, angular, or (most important) *both.* Also, it provides torsional resiliency that cushions shock and vibration. Thus it saves wear-and-tear on your connected equipment.

To prove these claims and enjoy these savings, install a FALK Spacer on one application—and see for yourself. Consult your FALK Representative or Authorized Distributor.

THE FALK CORPORATION, MILWAUKEE 1, WISCONSIN
MANUFACTURERS OF QUALITY GEAR DRIVES AND FLEXIBLE SHAFT COUPLINGS
Representatives and Distributors in many principal cities.

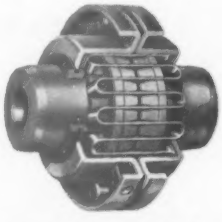


EASY AND QUICK TO INSTALL, DISCONNECT OR RECONNECT

First, mount shaft hubs to allow proper distance between hubs; then, align driving and driven units.

Second, compress Spacer to fit space between hubs and tighten cap screws to pull spacer hubs into the registered fit.

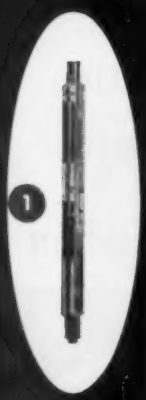
To disconnect, reverse the second step. No draining of lubricant necessary.



The heart of the FALK Spacer ...the basic Type F Steelflex
Write for Service Manual 4838

FALK
...a good name in industry

IN SLIM HOLE DRILLING



. . . look to Halliburton for the best selection of Special Formation Testing and Service Tools. Each tool is a scaled-down, compact version of its larger counterpart — field proven in wells throughout oilfields all over the world.

Every tool is engineered with experience . . . built with care . . . and run under the expert guidance of your nearby Halliburton Tool Operator.

for running formation tests in open hole, 3½", I. D. and larger:

- "TC" Circulating and Closed-In-Pressure Valves (1)
- Hydro-Spring Testers (2)
- Open Hole Packers
- Anchor
- B. T. Gauges and Running Cases

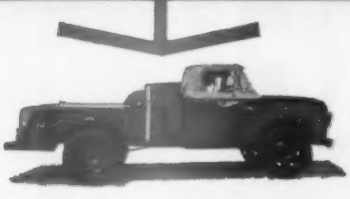
These special tools for cased holes, 3½" O.D. and up:

- All Tools above, except Packers
- RTTS Packers (3)
- Hook Wall Packers

These additional tools for cased holes, 4½" O.D. and larger:

- Retrievable Bridge Plugs
- RTTS Packers (3)
- R-3 Treating Packers (4)

Your Halliburton Representative can show you how to put the right combination of these tools to work for you in your next Slim Hole Operation. Call him . . . soon!



"Special Service Tools for Slim Hole Jobs"

HALLIBURTON

TESTING AND SPECIAL TOOLS SERVICES

HALLIBURTON COMPANY • DUNCAN, OKLAHOMA

MORE USABLE POWER
LATEST DESIGN
NOW OUTSELLING ALL COMPETITION SINCE ITS RECENT INTRODUCTION
IT'S THE
FRANKS
EXPLORER

There's a reason why the Franks Explorer is now outselling all its competition. It's because the Explorer has proven itself in the field . . . proven itself to be a truly rugged oil field designed, self-propelled servicing and workover rig that meets all of today's demands for power, speed, efficiency and dependability! It's the unit preferred by superintendents — the one with the highest resale value. And because of this, the Explorer is the most imitated unit in the field!

Explorer Cruiser

EXPLORER PROFIT MAKING FEATURES

- Less downtime thru industrial engine economy, power and dependability
- Portability and capacity to match every job
- Stays modern years longer than competitive models
- Off-highway equipment exemption tax privileges
- Encourages standardization
- Field acceptance established
- **High resale value as used equipment**

WELL SERVICING AND DRILLING UNITS

FRANKS

DIVISION OF

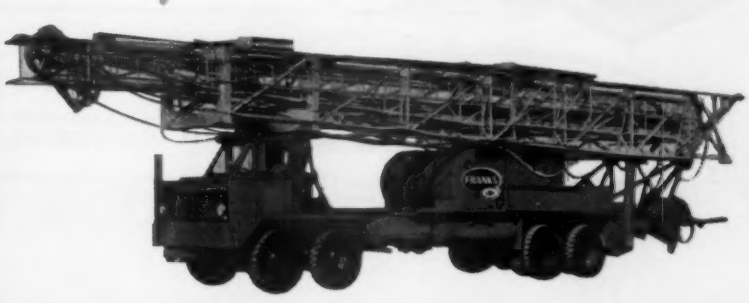
CABOT

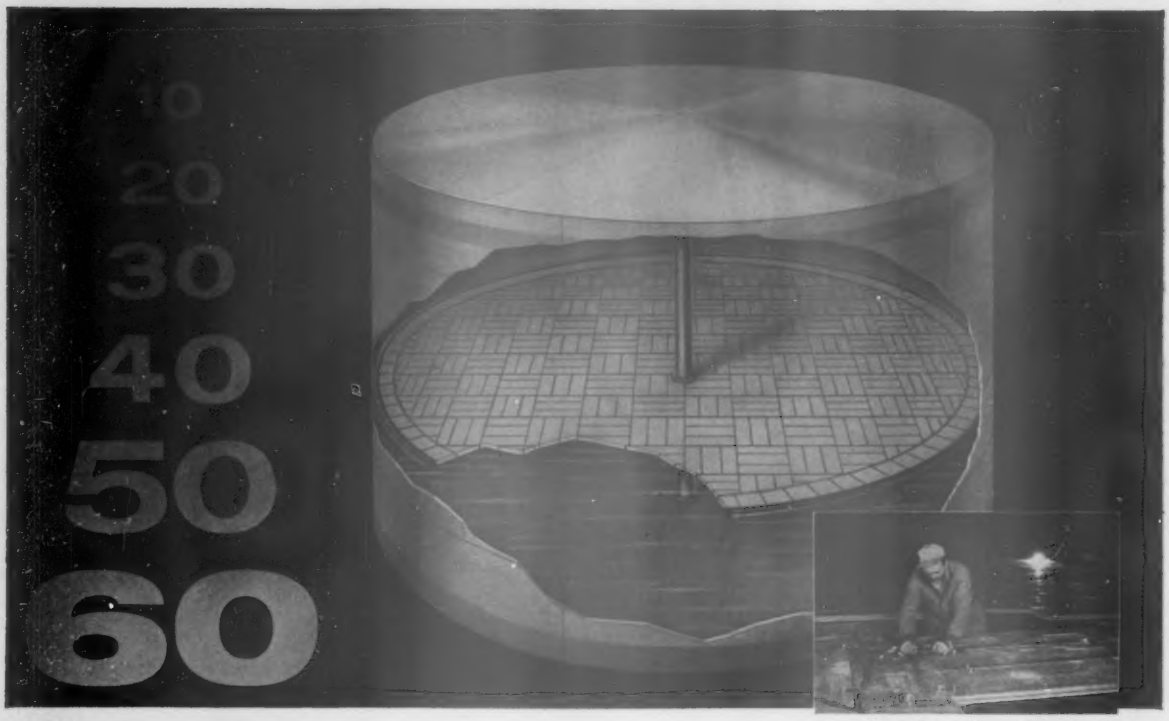
PAMPA, TEXAS

EXPLORER DESIGN FEATURES

- Full view control console
- Low silhouette drum guards
- Removable sandreel for lighter weights
- Engineered weight distribution
- True capacity rated derricks, 100,000 to 275,000#

Explorer Rocket





70 ft. HAMONDFLOTE COVER

converts old riveted vessel to modern floating roof tank

A rigid foam plastic Hamondflote Cover was quickly and easily installed in this 70 ft. diameter riveted tank. Using conventional hand tools in a simple assembly operation, maintenance personnel converted the vessel to an efficient conservation tank.

SIZE IS NO LIMITATION . . . the Hamondflote Cover can be used to modernize tanks up to any diameter in use today, regardless of the number or location of supporting columns. It reduces evaporation losses by as much as 95%, is completely resistant to a wide range of chemicals and petroleum hydrocarbons and will withstand temperatures from −94°F. to +300°F.

Write for bulletin which tells the entire Hamondflote Cover story.

1. Sections of the Hamondflote Plastic Cover are easily put together with tongue and groove joints and simple hand-tightened clamps.

2. Here the 70 ft. Cover is almost completed. Note that it is strong and rigid enough to support the workman's weight.

3. Rivets, columns and other protrusions on the inside wall of the tank present no problems. The flexible packing gland easily slides over them when the roof is rising or falling with the liquid level.

HAMONDTANKS

12 plants to serve you coast to coast

PDM

ENGINEERS · FABRICATORS · CONTRACTORS

Pittsburgh-Des Moines Steel Company

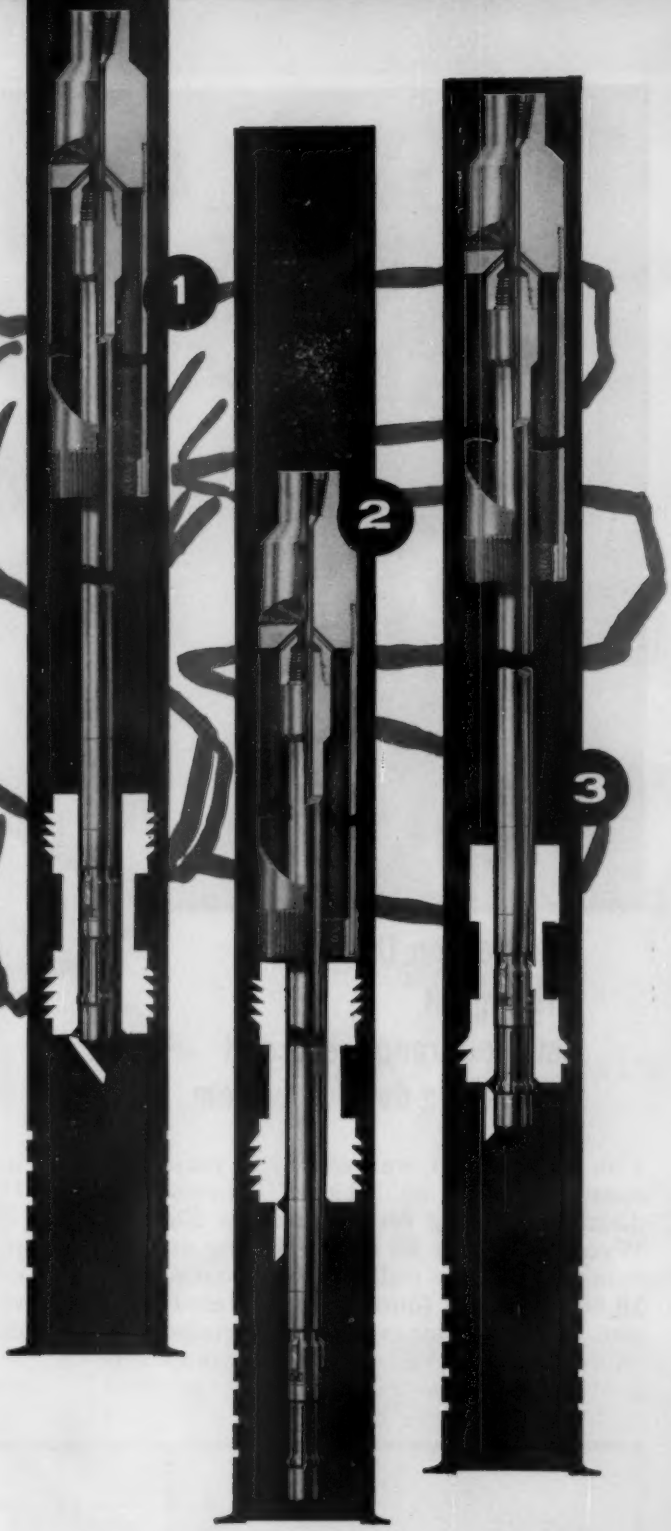
Plants at PITTSBURGH, WARREN, BRISTOL, PA. • BALTIMORE • BIRMINGHAM • DES MOINES
PROVO, UTAH • CASPER, WYO. • SANTA CLARA, FRESNO, STOCKTON, CALIF.

Sales Offices

Atlanta 5 • Baltimore 26 • Boston 10 • Bridgeport 5 • Chicago 3 • Dallas 1 • Denver 2 • Des Moines 8 • El Monte • Fresno • Jacksonville • Los Angeles 57 • Newark 2 • New York 17 • Pittsburgh 25 • Sacramento • Santa Clara • Seattle 1 • Stockton licensees and sales offices in many foreign countries including Argentina, Australia, Belgium, Brazil, Canada, Chile, Colombia, England, France, Haiti, India, Italy, Japan, Mexico, Netherlands, Peru, Puerto Rico, Sweden and W. Germany.

The SAFE-SURE way to retrieve DRILLABLE PRODUCTION PACKERS

the BOWEN PACKER RETRIEVER



It is as simple as one, two, three – and it is the fastest, most reliable, trouble-free method of retrieving packers.

Passes through the bore of the packer in catching position.

Prevents loss of packer during milling.

Pulls the packer after it has been milled over.

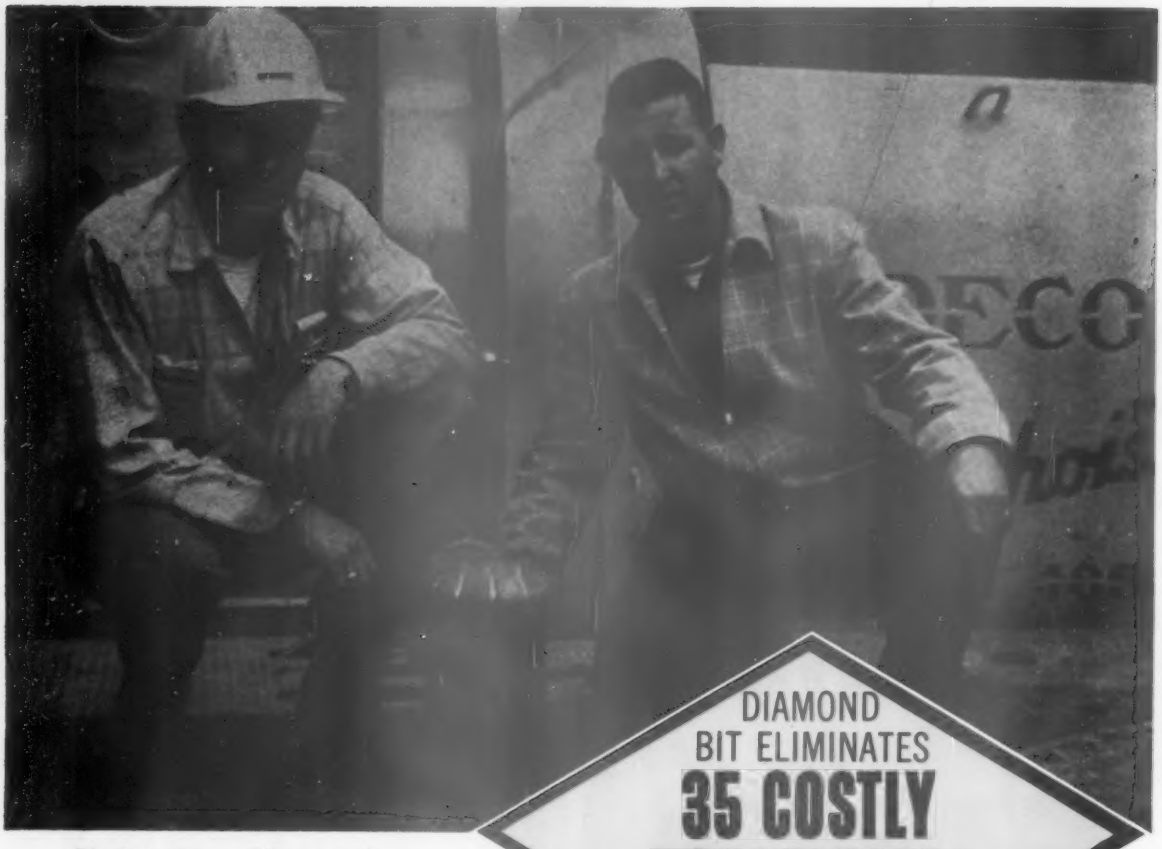
One trip does it all—milling, catching, retrieving. The Retriever can be released from the packer if necessary and re-set to catching position — all without coming out of the hole.

Demand the Best
Demand Bowen Packer Retrievers
Complete Brochure available upon request

For over 25 years—the world's leading manufacturer of fishing and specialty tools.

BOWEN ITCO, INC.
P. O. Box 4587 Houston 13, Texas, U.S.A.
Cable Address: ITCO

BOWEN
25th ANNIVERSARY 1935 1960



DIAMOND
BIT ELIMINATES
35 COSTLY ROUND TRIPS

Christensen Diamond Drilling Bit sets endurance record of 28 rotating days on bottom

The new record was set by a major oil company using an 8-11/32" Christensen diamond drilling bit in Natrona County, Wyoming. After 28 days rotating on bottom the bit was pulled at approximately 16,000 feet and found to be in fair condition. The operating company estimated that 35 round trips and 35 conventional bits would have been needed to drill the same intervals and that the diamond bit saved 18 days.

The bit operated under 10,000 to 16,000 pounds of weight at 53 to 57 R.P.M. The drill string consisted of 4-1/2" drill pipe, nine 7" collars with a set of jars. A second diamond bit had no trouble reaching bottom and ran for 16 rotating days, also surpassing the old 13 day record for the area.

For "Less Cost Per Foot" drilling, contact Christensen Diamond Products Company for information about its complete line of diamond bits and core barrels.

"Less cost per foot."

CHRISTENSEN DIAMOND PRODUCTS

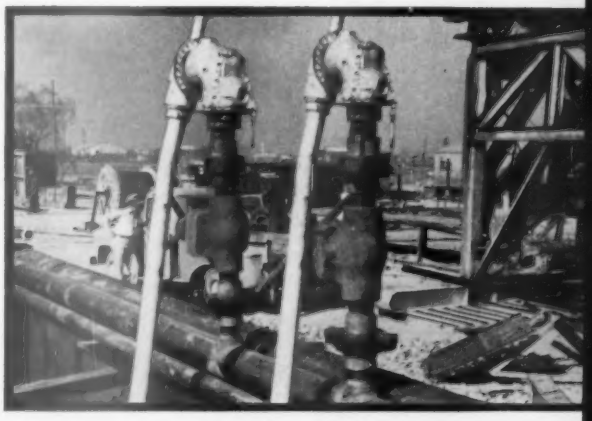
MAIN OFFICE AND PLANT 1937 SOUTH 2nd WEST
P. O. BOX 387 SALT LAKE CITY, UTAH

Making up the piping on this rig is just like assembly line production, since we st
with WECO Unions. There is never any question about unions of the same size ar
rating making-up and sealing tight with a few hammer blows. There is no time lost
for and matching different makes of unions. Replacements are seldom needed but
are they can be had from the nearest supply store, and the same is true when we
tional WECO Unions.

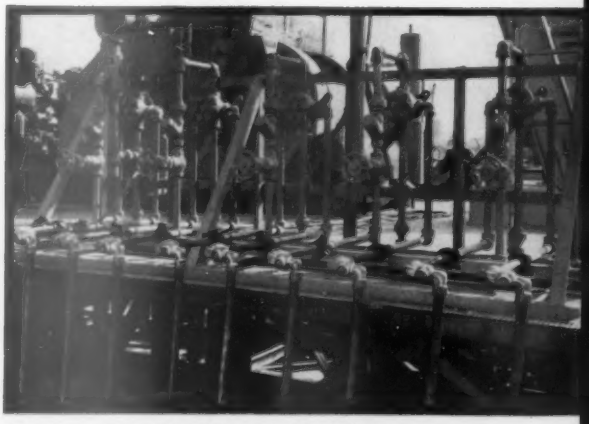
Most of the Unions have been on this rig a long time. They have been on dozens o
made-up and broken-out many, many times, and are still giving remarkable service.

Standardizing with WECO UNIONS is one of the best things we ever did to this

With WECO Unions on the mud lines, both suction and discharge, all of the piping with its valves and fittings are put in place easily and quickly, without trouble and without leaks.



WECO Unions are ideal for setting up Chiksan Mud Guns. A few hammer blows on the wing nut and the connection is tight and leak proof. Using the same size and pressure-rated Unions, there's no problem of matching the right gun with the right location.



A real complex piping job made simple by the use of WECO Unions and Chiksan Swivel Joints.

standardized
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and for the
standardize

. . . we
rig up
in record
time since
we standardized
with
WECO Unions

Production . . .

Field headers and manifolds;
tank batteries; heater, treate
metering station manifolds; flow
head connections are made u
more efficiently with WECO U

Service Opera

Secure make-up and easy break
job, handling extra high pressu
bration and pulsation have pr
tance of standardizing with WI
and their companions Chiksan S
for such operations as cementi
fracturing. That's why most
companies are standardizing on
and Chiksan Swivel Joints.

SIZES AND PRESSURE RAT
FOR EVERY OIL FIELD SER

**Sizes: 1" through 12". Pressure Rati
through 15,000 psi. In addition to st
WECO Unions are also available in M
sulated, and Flat Face types. All are
special "33" coating for high resistanc
and electrolytic action.**

**Ask your WECO representative to hel
program of standardizing with WECO U
oil field operations.**

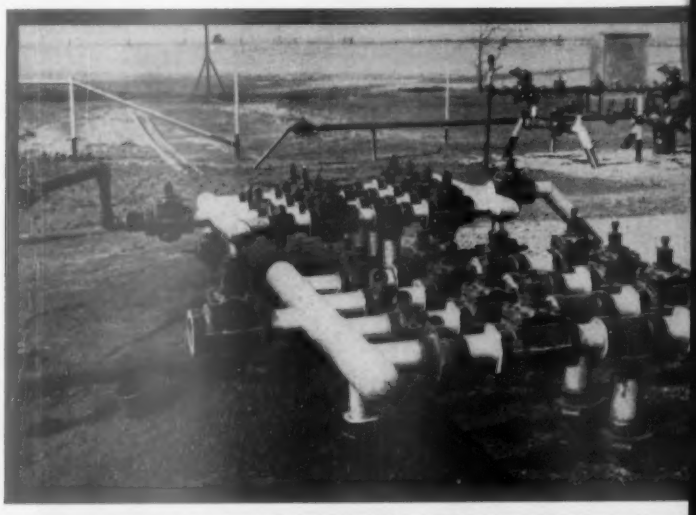
WECO®

WE

Division

WECO UNIONS

...ese services, too, it's wise to ...ze with WECO



...

...ds; separators and ...eater installations; ...flow lines and well ...e up quicker and ... Unions.

...rations...

...eak-out on job after ...essures, extreme vi- ... proven the impor- ... WECO Unions . . . ...an Swivel Joints . . . ...nting, acidizing and ...st oil field service ... on WECO Unions

...RATINGS ...SERVICE

...Ratings: 1000 psi ... standard types, ... Mis-aligning, In- ...re available with ...ance to corrosion

... help you plan a ...O Unions in your

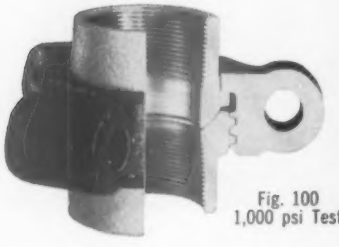


Fig. 100
1,000 psi Test

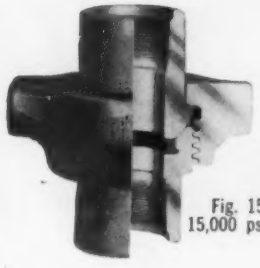


Fig. 1502
15,000 psi Test

...VELL EQUIPMENT MFG. CORP.

HOUSTON, TEXAS

...sion of CHIKSAN COMPANY *a subsidiary of* FOOD MACHINERY AND CHEMICAL CORPORATION

U-5-60

fmc

FOOD MACHINERY AND CHEMICAL CORPORATION

...

CHIKSAN SWIVEL JOINTS

HAMER LINE BLIND VALVES

HAMER PLUG VALVES

WECO AIR-O-UNION

WECO COMPOUNDS

WECO SNATCH BLOCKS

Solvent-welding makes joining Butyrate pipe a simple and rapid operation.

Oil field workers appreciate the ease with which pipe of Tenite Butyrate plastic can be handled.

This lightweight pipe is tough

Butyrate plastic pipe takes the abuse of oil field use

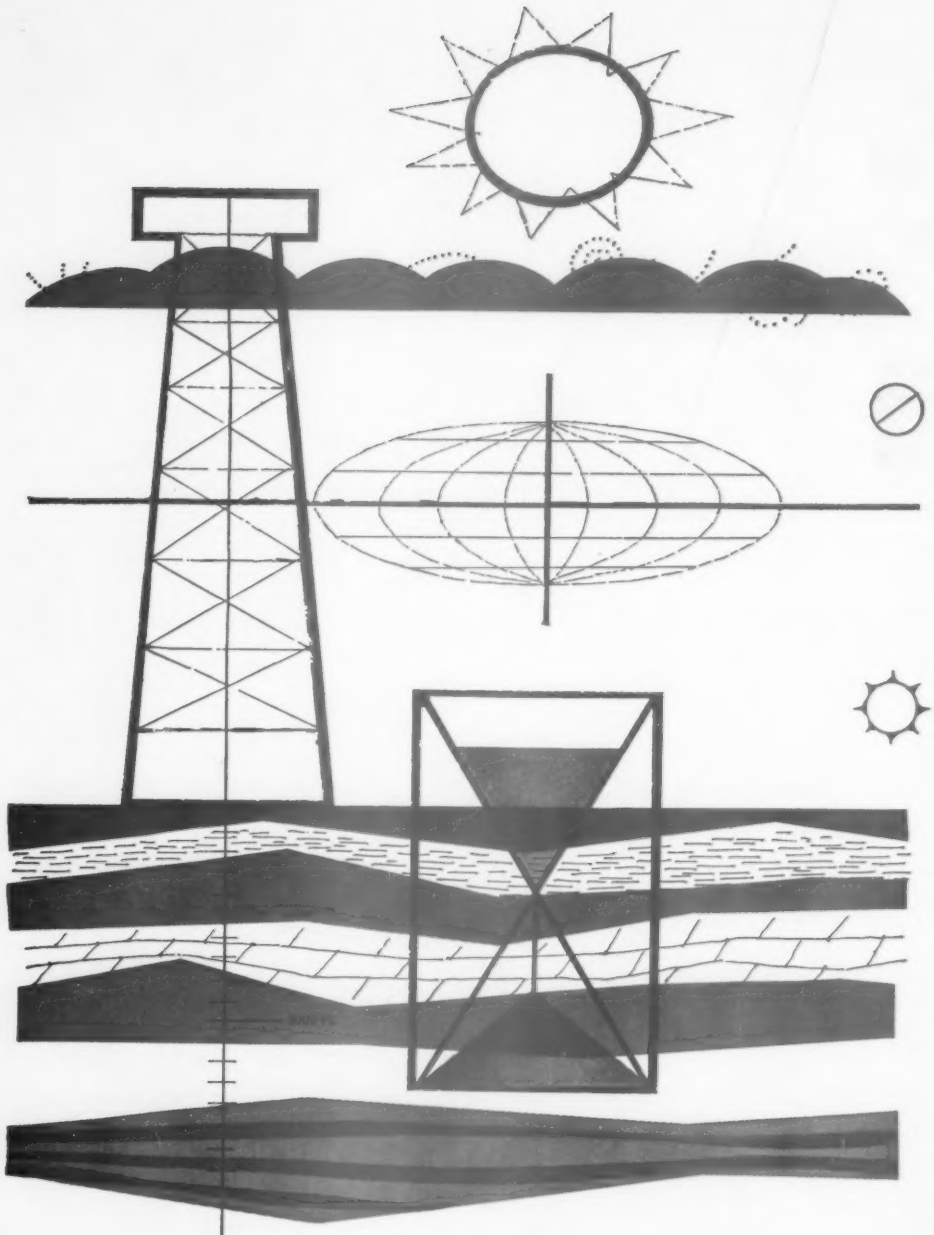
A pipe has to take some pretty rough handling in oil fields. And that's just what pipe of Tenite Butyrate plastic has been doing for nearly a decade.

Its horn-like toughness and high impact strength enable Butyrate pipe to take all normal backfilling operations. What's more, this pipe is semi-rigid. It gives with ground movement and facilitates direction and contour changes.

Once pipe of Tenite Butyrate is installed, you can forget it. Virtually non-corrodible, it keeps maintenance costs at a minimum. The smooth inner wall of this pipe works for you in two ways. It offers low frictional resistance, thereby giving greater flow volume than metal pipe for any given head loss, *and* it minimizes clogging by discouraging the accumulation of paraffin.

Millions of feet of Tenite Butyrate plastic pipe are now in use in the petroleum industry. Perhaps this pipe could cut costs in your operations. We will be happy to send you additional information about its properties and applications, plus the names of companies that produce the pipe and a complete range of fittings. Address: EASTMAN CHEMICAL PRODUCTS, INC., subsidiary of Eastman Kodak Company, KINGSPORT, TENNESSEE.

TENITE
BUTYRATE
an Eastman plastic



NBT

THE BANK THAT WAS BORN IN THE OIL FIELD

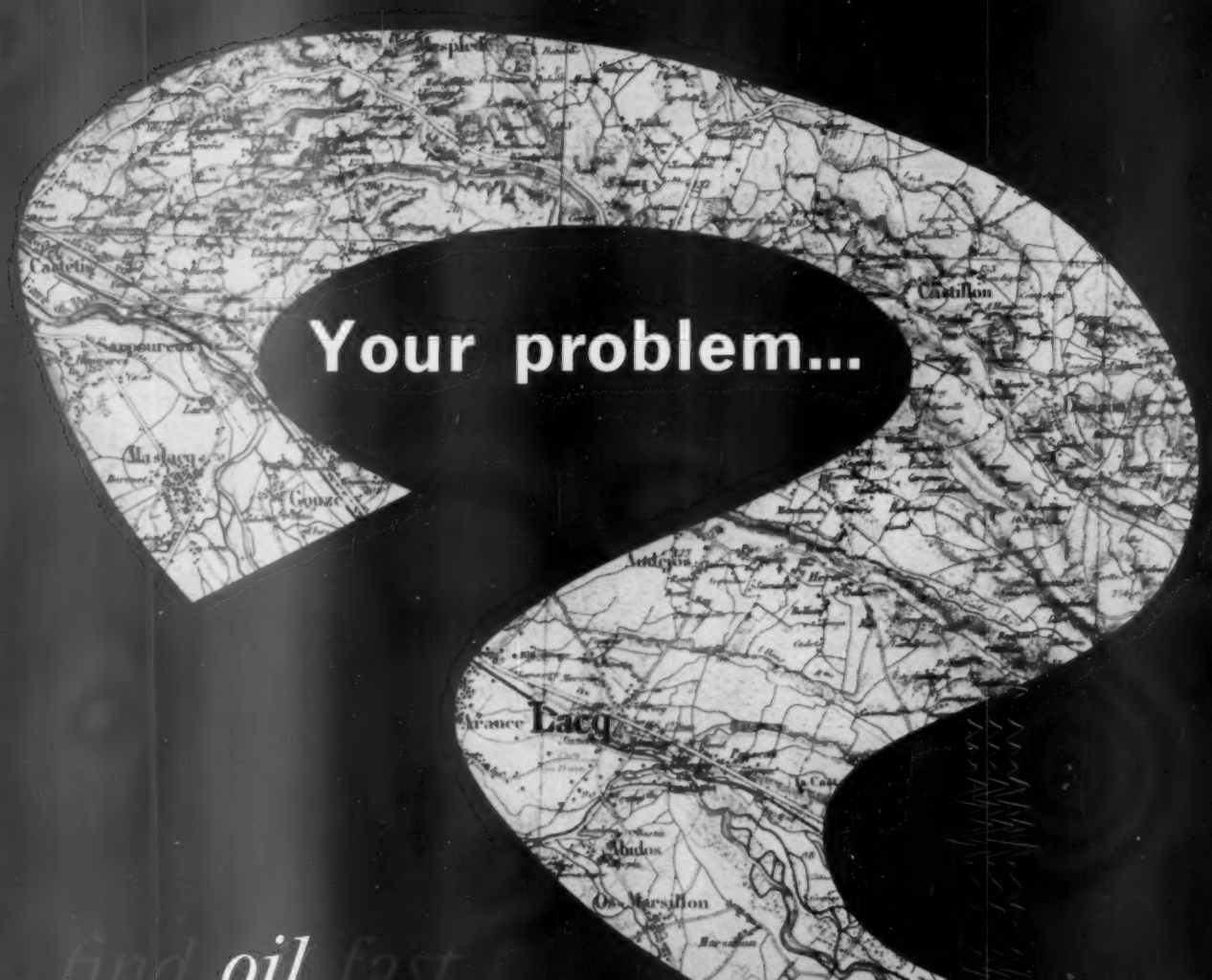
In the Oil Department at National Bank of Tulsa, there's no separating of Oil from Banking — they're one and the same — because NBT was "born in the oil field." Correspondent banks receive valuable assistance by dealing with the Oil Department of NBT — the Oil Bank of America.

OIL BANK OF AMERICA

NATIONAL BANK OF TULSA

NATIONAL BANK OF TULSA

Member Federal Deposit Insurance Corporation



... find oil fast at lower cost !

Map drawn and edited by the Institut Géographique National.

Parentis - Lacq
Hassi-Messaoud - Zarzaïtine
Tiguentourine - Hassi R'Mel

COMPAGNIE GÉNÉRALE DE GEOPHYSIQUE

50, RUE FABERT - PARIS 7e - PHONE : INValides 46-24

KELLOGG'S WIDENING WORLD

Reduces Unit Investment and Operating Costs

Kellogg Alkylation Units Throughout The Refining World

ARGENTINA	
La Plata	1,600 BPD
AUSTRALIA	
Melbourne	2,000 BPD
Sydney	3,400 BPD*
CANADA	
Vancouver, B.C.	1,000 BPD
Calgary, Alberta	1,500 BPD
Montreal, Quebec	1,600 BPD
CHILE	
Concon	1,100 BPD
IRAN	
Abadan	6,000 BPD
SAUDI ARABIA	
Ras Tanara	1,400 BPD
UNITED STATES	
East Chicago, Ind.	2,600 BPD
Beaumont, Texas	5,000 BPD
Texas City, Texas	3,500 BPD
Whiting, Ind.	5,000 BPD
Lake Charles, La.	12,750 BPD
Lake Charles, La.	10,675 BPD

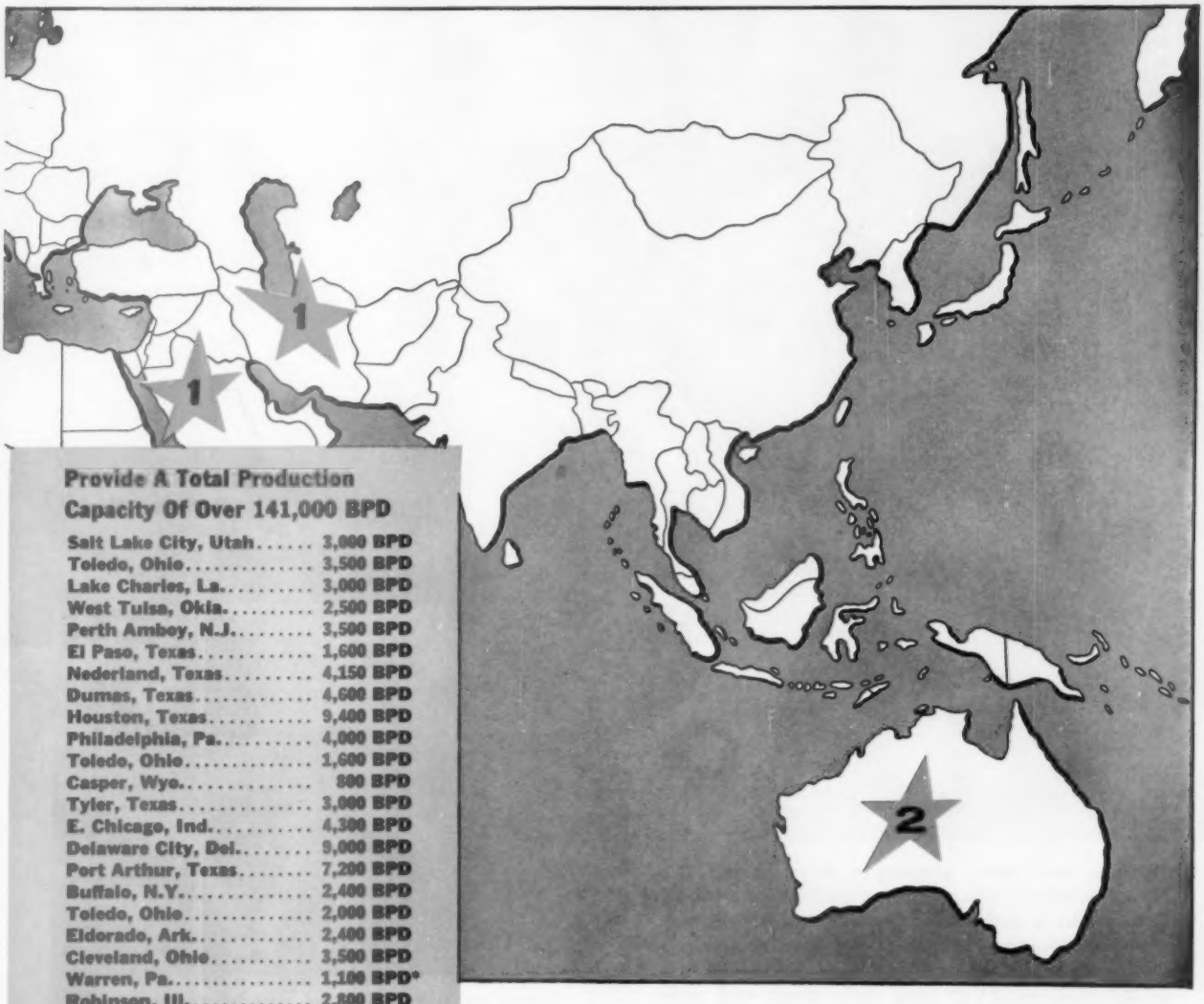
FOR REFINERS wishing to increase their barrel octane for the lowest optimum over-all expenditure, Kellogg can design and build an alkylation unit which will utilize normal refinery feeds, yield the desired quantity and quality of alkylate, yet cost less to install and operate than ever before.

This economic approach to a high octane product for the gasoline pool, when and as required, is made possible through Kellogg's experience to date in engineering and building 38 alkylation units of various designs, for both large and small refiners, in 6 foreign countries as well as in 13 States at home.

The most efficient, most economical, and most flexible of these alkylation units are those utilizing Kellogg's most recent sulfuric acid, multi-stage cascade reactor design. Whether for 500 or 15,000 BPD, Kellogg can undertake the entire design, procurement, and construction of one of these units for a lump-sum contract.

OF ALKYLATION EXPERIENCE

—Increases Range of Feedstocks and Yields



Provide A Total Production Capacity Of Over 141,000 BPD

Salt Lake City, Utah	3,000 BPD
Toledo, Ohio	3,500 BPD
Lake Charles, La.	3,000 BPD
West Tulsa, Okla.	2,500 BPD
Perth Amboy, N.J.	3,500 BPD
El Paso, Texas	1,600 BPD
Nederland, Texas	4,150 BPD
Dumas, Texas	4,000 BPD
Houston, Texas	9,400 BPD
Philadelphia, Pa.	4,000 BPD
Toledo, Ohio	1,600 BPD
Casper, Wyo.	800 BPD
Tyler, Texas	3,000 BPD
E. Chicago, Ind.	4,300 BPD
Delaware City, Del.	9,000 BPD
Port Arthur, Texas	7,200 BPD
Buffalo, N.Y.	2,400 BPD
Toledo, Ohio	2,000 BPD
Eldorado, Ark.	2,400 BPD
Cleveland, Ohio	3,500 BPD
Warren, Pa.	1,100 BPD*
Robinson, Ill.	2,800 BPD
Toledo, Ohio	3,500 BPD

**Future*

Designed to operate on butylene, propylene, amylenes, or a combination feed, these new units offer many advantages over other models. They can produce an LPG product, as well as high octane alkylate, without supplementary towers or equipment. They reduce corrosion to a minimum without extensive use of expensive chemicals. They are extremely low on acid consumption—using, for example, less than 0.3 sulfuric acid per gallon of alkylate. They are adaptable to seasonal demands—capable of maintaining peak barrel octane production at minimum operating cost.

Kellogg welcomes the opportunity to discuss the details of its alkylation process with you.

THE M. W. KELLOGG COMPANY

711 Third Ave., New York 17 *A subsidiary of Pullman Incorporated*

Offices of Kellogg subsidiary companies are in Toronto, London, Paris, Rio de Janeiro, Caracas, Buenos Aires

The GOLDEN GIRLS ARE GONE...

Now Mid-Continent's U-712 is the star performer

Oil Show rig now drilling in Argentina

Having seen more glamorous days in the Oil Show limelight, this rugged Mid-Continent U-712 Drawworks is now performing for a major drilling contractor on the Pampas of Southern Argentina. Designed as a single package unit, the U-712 has a 25" O.D. by 51½" long main drum and self-equalizing 48" by 10" brakes. Fawick VC Clutches are mounted on the drum shaft for low and high drum drives, with an emergency splined clutch provided for the low drive. Grease lubrication for bearings, and flood lubrication for chains, sprockets and splined clutches is designed-in the drawworks. For complete information, write for the U-712 Bulletin or contact your Mid-Continent representative.

Pictured here at rig-up time, and ready for shipment to Argentina, this rig with the Mid-Continent U-712 Drawworks, AE Swinging Compound and Swinging Pump Drives to two D-700 Emsco Pumps, is powered by Cummins VT-12 TURBODIESEL Engines.

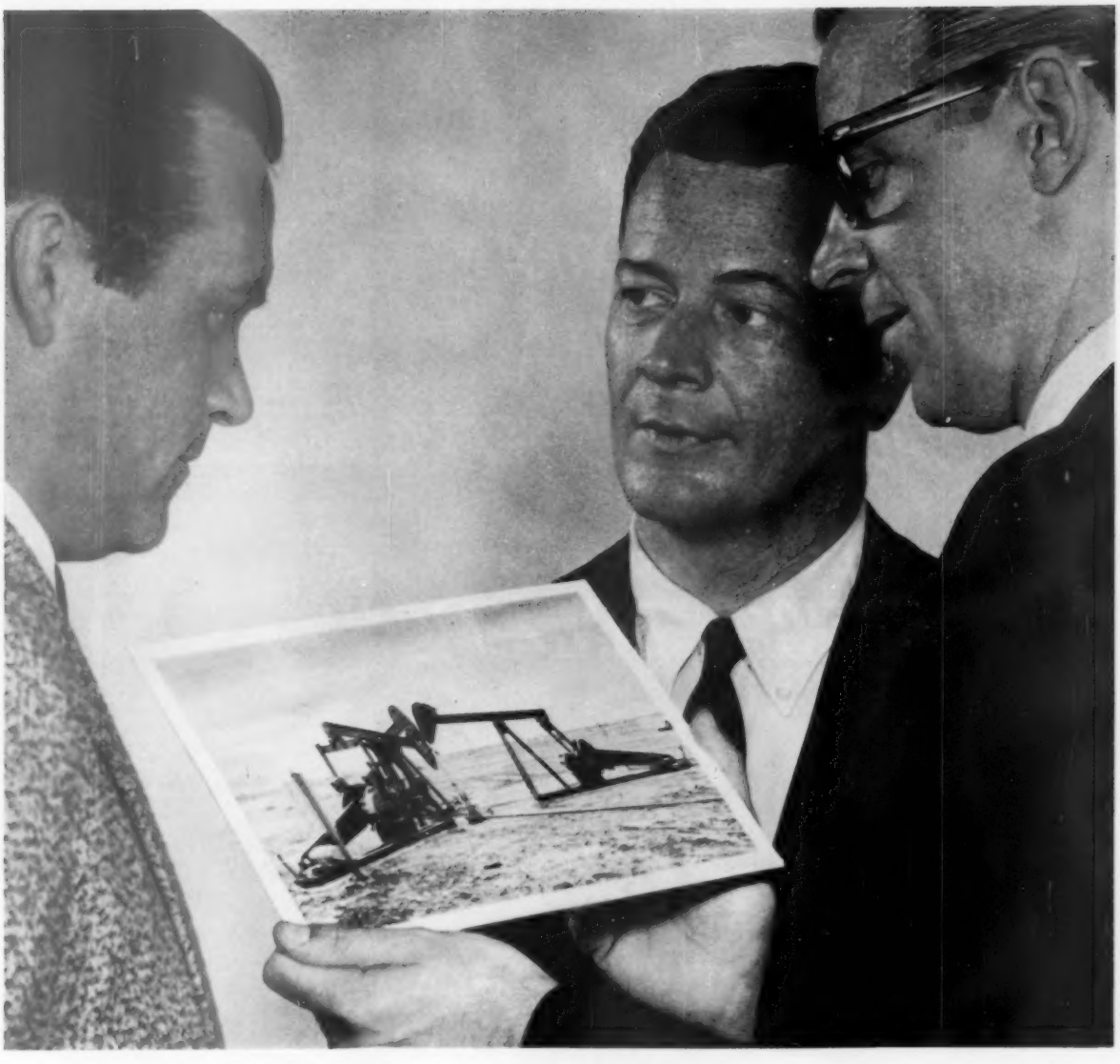
MID-CONTINENT—SUPERMARKET FOR THE OIL INDUSTRY

DW2-0

MID-CONTINENT SUPPLY CO.

THE WORLD'S LARGEST INDEPENDENT OIL FIELD SUPPLY COMPANY

Mid-Continent Building, Fort Worth, Texas • Export Division: 45 Rockefeller Plaza, New York 20, N.Y. Cable: MIDCUMPORT NYK

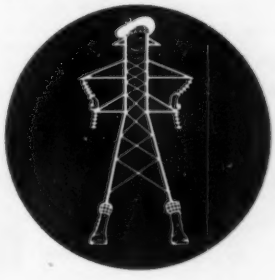


3 heads are better than 1 . . .

Often a utility electric power company engineer enters into a decision with one or more oil company engineers . . . effecting the economy of operation. This assistance is available anytime to oil producers, pipeline personnel or refinery engineers. As a matter of interest the triple pumper in the photograph pumps simultaneously from three producing zones.

Petroleum Electric Power Association
BOX 35006, DALLAS 35, TEXAS

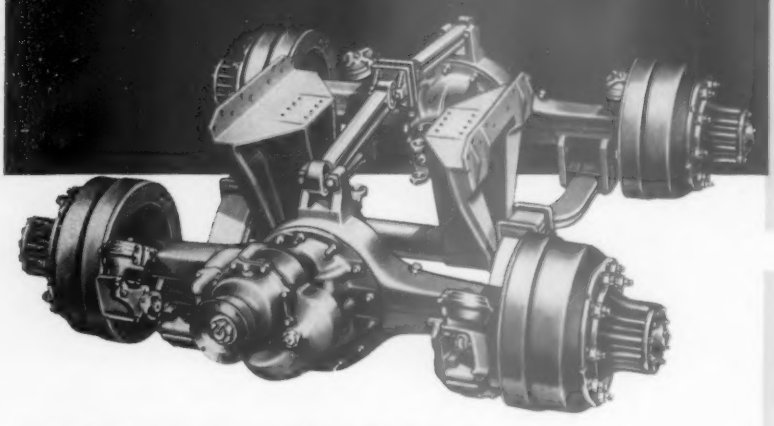
Utility Electric Power saves money, manpower, maintenance and serves you better automatically

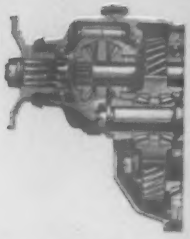


A list of P.E.P.A. members will be furnished on request

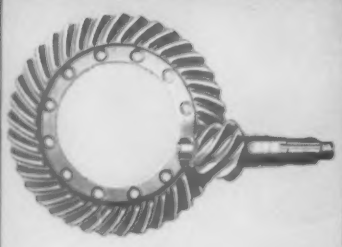
MORE THAN 200 MILLION EXTRA TON-MILES OF PAYLOAD IN JUST 5 YEARS

WITH TIMKEN-DETROIT® LIGHTWEIGHT TANDEMS





Driver Controlled Inter-axle Differential. Allows differential action between the axles to compensate for worn or mismatched tires . . . both axles do equal amounts of work. Can be dis-engaged at any speed giving positive thru-drive when better traction is needed.



Stronger Gear Sets. Hypoid gearing provides up to 30% more strength than spiral bevel gears of the same size. Modern hypoid design allows larger and stronger pinions with greater tooth contact area . . . assuring top efficiency and long life.

New Suspension Pushes Tandem Weight Savings Over 1000 Lbs. Rockwell-Standard's "taper-leaf" springs coupled with the latest in balanced suspension system designs is up to 475 lbs. lighter than comparable units. When combined with the payload advantages of the Lightweight Tandem you can save more than 1000 pounds per trip. This means thousands of ton-miles in extra payload per year.

In the five years since Rockwell-Standard introduced Timken-Detroit Lightweight Tandems, thousands of users have rolled up millions of extra ton miles of payload. Check the superior features illustrated at right. They are some of the reasons why these axles are first choice with over-highway operators:

Plus these additional Timken-Detroit advantages:

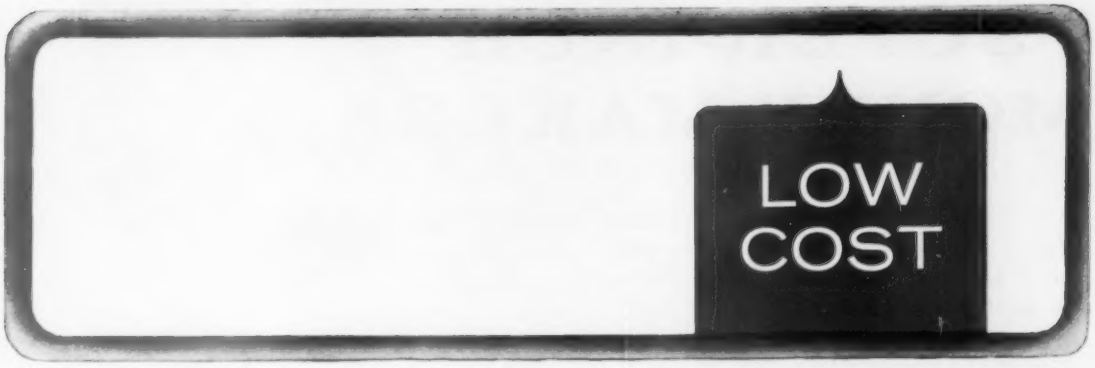
- In-line drive reduces wear on working parts
- High degree of parts interchangeability
- Large selection of gear ratios
- Torsion-Flow axle shafts
- Wide range of capacities – 8 models from 22,000 to 44,000 pounds

Another Product of...

ROCKWELL-STANDARD CORPORATION

ROCKWELL R STANDARD ®

Transmission and Axle Division, Detroit 32, Michigan



with efficient, economical Davison Silica Gel

Hydrocarbon recovery from the dehydration of natural gas can pay your gas drying costs. The large pore volume of Davison Silica Gel attains recovery efficiencies up to 95%. For example, a unit operating on 30 to 120 minute cycles at 100° F. can recover up to three gallons of butane-plus per 100 lbs. of silica gel.

Specify Davison Silica Gel in your hydrocarbon recovery unit. Write Dept. 3107 for complete information.

Department 3107
W.R. GRACE & CO.
DAVISON CHEMICAL DIVISION
BALTIMORE 3, MARYLAND

SUPER-INCH MONEY-MAKER

Allis-Chalmers 225-hp HD-21 has the power, side boom capacity and over-all strength to make money for you on the biggest pipe—and the over-all design superiority to do it in any kind of terrain.

Pipeliners are using Allis-Chalmers HD-21 side boom crawlers to handle the biggest pipe loads; 34-in., 36-in., 42-in.—and heaviest of all—the concrete-coated pipe. And these big-capacity machines not only move right along with the super-inch stuff, but they also work profitably on medium-inch lines.

When you consider your next pipeline tractor spread, look at every factor—original cost, fuel consumption, ease of maintenance, life of components, over-all performance, nationwide dealer service—and you can look to Allis-Chalmers for your best tractor buy.

Note the rocky, abrasive ground in this picture. There's just one track that's made-to-order for this rough stuff—that's Allis-Chalmers. Special steels that are specially heat-treated make these track shoes, side bars, track pins and bushings the industry's toughest.

One last point. Pipeliners say nothing matches an Allis-Chalmers side boom tractor for flotation and maneuverability in muddy, swampy going. A tractor that's dependable in mud is good anywhere. Your Allis-Chalmers construction machinery dealer is eager to prove it with a demonstration. He is also in a position to give you the best possible terms. Allis-Chalmers, Construction Machinery Division, Milwaukee 1, Wisconsin.

HD-21
Crawler Tractor

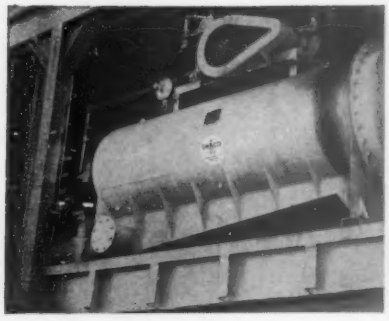
- *225 net engine hp*
- *Hydraulic torque converter drive*
- *Bare tractor weight: 46,200 lb (long track model)*
- *Weight with side boom: 79,050 lb*
- *Side boom lifting capacity: 127,000 lb at 4 ft*

move ahead with
ALLIS-CHALMERS
power for a growing world

VETERANS OF THREE YEARS OF TOUGH PIPELINING. These HD-21's are three years old and still going strong. Owner reports, "These tractors have been steady, dependable performers under tough operating conditions."

Three good ways to cut drilling costs

The three units shown here are important items behind the recent revolution in drilling fluids that has done so much to speed drilling and cut costs. Each is designed for a different problem but all are efficient and economical. Equally important, all are handled by SWACO -- the leader in mud-treating equipment.



SWACO D-GASSER®

Operators frequently report saving the entire rental cost of a D-Gasser on a well in less than a day.
When mud is gas-cut, the D-Gasser saves money in many ways. It cuts time lost for circulating after trips. It reduces barite costs, it minimizes lost circulation costs and problems. It maintains mud pump efficiency and it actually makes possible the close control of mud weight and viscosity that results in faster drilling with increased safety.

CLAYJECTOR®

If you are using mud as heavy as 12 pounds per gallon, you can cut mud costs and increase drilling rate by using a Clayjector. This is a cyclone-type separation unit that is extremely effective at rejecting unwanted clays and retaining expensive barite.
In addition, since it makes possible the economical maintenance of a low-solids, low-viscosity mud, it actually permits a reduction in bit costs and drilling time.

D-SANDER®

The D-Sander greatly increases the life of mud pump parts and bits when sand or abrasive shale is being drilled. Since it removes virtually all sand-sized solids from the mud, excessive pump-parts and bit-nozzle wear — as well as many other problems — are avoided when a D-Sander is used. There is a size and type to fit every rig and drilling condition.

These descriptions tell just a few of the many ways you can cut costs by mechanical mud treating. For the full story on how you can profit, call your nearest SWACO representative or write us direct.

SWACO

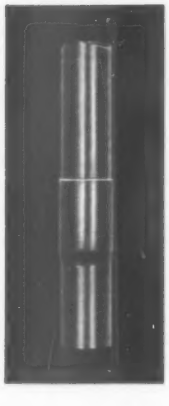
SALT WATER CONTROL, INC.
1809 CONTINENTAL NATIONAL BANK BLDG., FORT WORTH 2, TEXAS
Telephone: EDison 2-4433 Cable Address: "SWACO" Fort Worth

LOUISIANA: New Orleans, Lafayette
OKLAHOMA: Oklahoma City
TEXAS: Houston, Corpus Christi, Fort Worth, Kermit
COLORADO: Durango

SOUTHWESTERN INTRODUCES

SPA 190

first in a series of oil country integral joint tubular products



Engineered expressly for more economical "Slim Hole" and "Multiple" completions

OUTSTANDING FEATURES

1. Recessed box for easier stabbing and greater resistance to hoop stress induced by make up.
2. Laboratory pull tests prove joint efficiency to be much greater than theoretical (calc.).
3. Interchangeable with 1½" 10Rd. A.P.I. non-upset tubing.
4. Multiple hydrostatic, shock and crush tests assure completely sound welds and true dimensional wall thickness.
5. Make and break tests far in excess of normal well servicing indicate excellent gall resistance.
6. Manufactured to conform to applicable parts of A.P.I. 5A standards.

Write for new folder covering complete details

LICENSED BY THE AMERICAN PETROLEUM INSTITUTE

SP PIPE

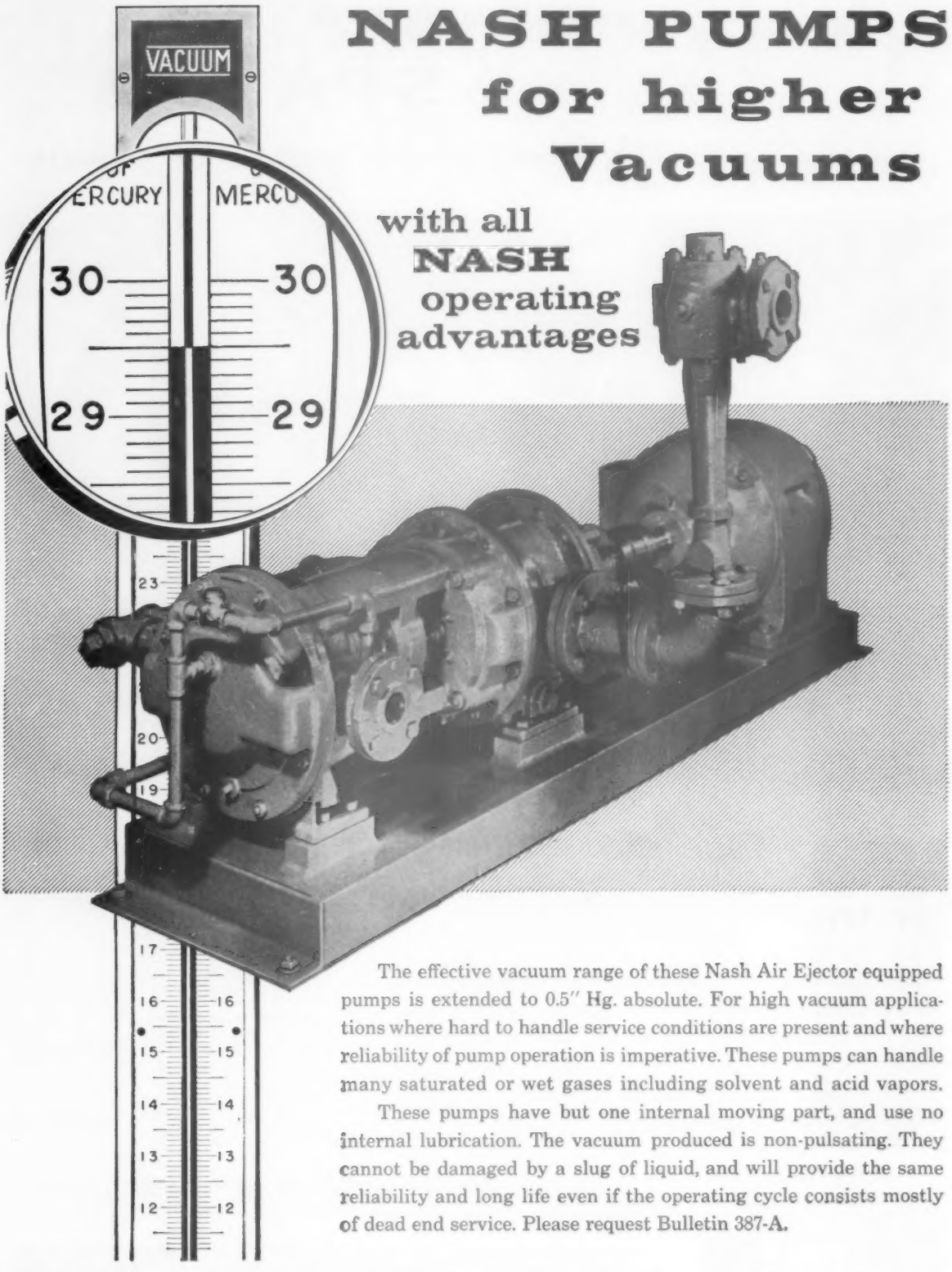
SOUTHWESTERN PIPE, INC.

P. O. BOX 2002 HOUSTON 1, TEXAS PHONE CAPITOL 4-0631

Sales Offices In Midland, Dallas and Tulsa

NASH PUMPS for higher Vacuums

with all **NASH** operating advantages

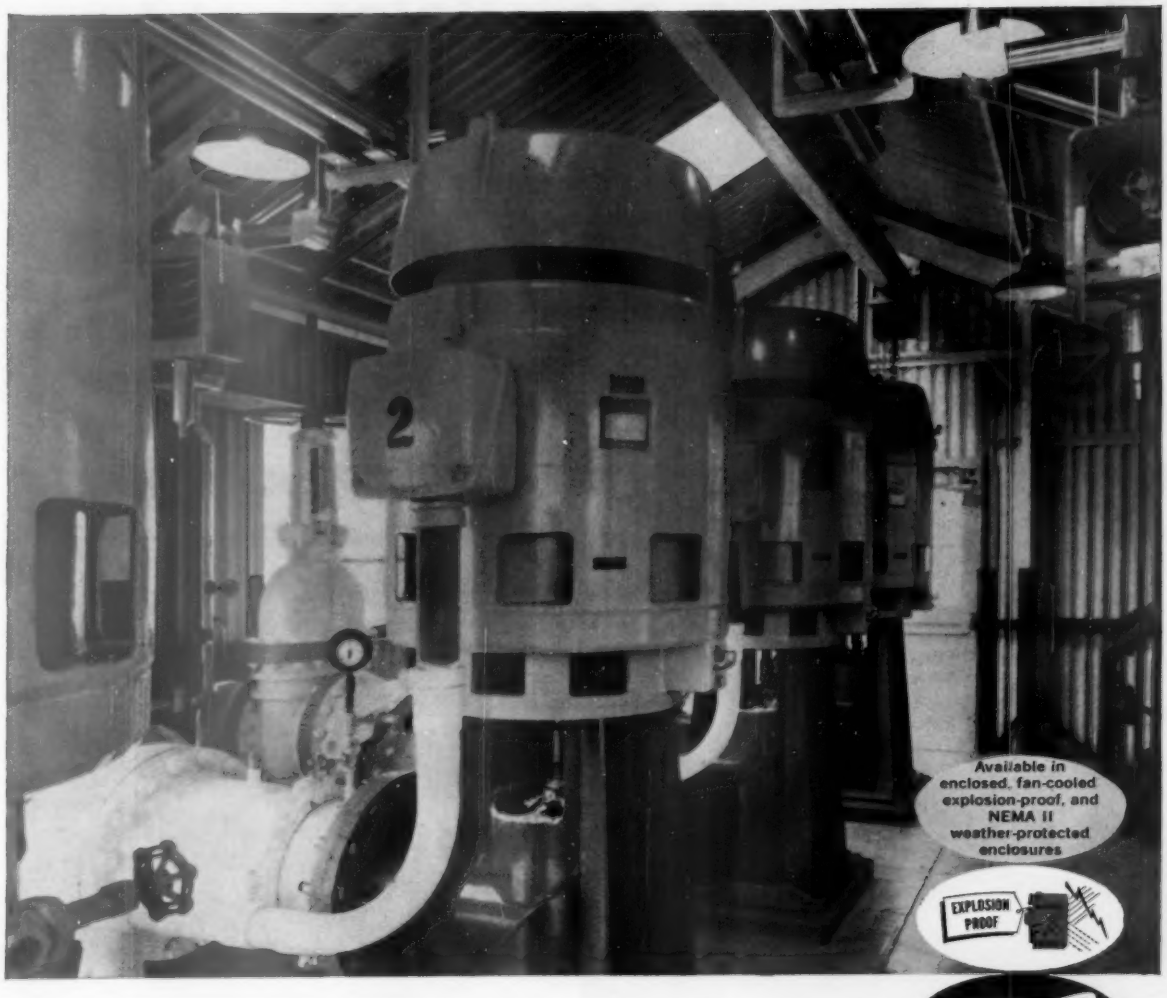


The effective vacuum range of these Nash Air Ejector equipped pumps is extended to 0.5″ Hg. absolute. For high vacuum applications where hard to handle service conditions are present and where reliability of pump operation is imperative. These pumps can handle many saturated or wet gases including solvent and acid vapors.

These pumps have but one internal moving part, and use no internal lubrication. The vacuum produced is non-pulsating. They cannot be damaged by a slug of liquid, and will provide the same reliability and long life even if the operating cycle consists mostly of dead end service. Please request Bulletin 387-A.

NASH ENGINEERING COMPANY

SOUTH NORWALK, CONNECTICUT, U. S. A.



These motors are climatized for trouble-free pumping anywhere!

You can use Louis Allis vertical motors indoors or outdoors

These motors are job-designed to keep your pumps going regardless of their environment. Even under rough conditions and in untended locations, upkeep is extremely low.

For example, new M-G-L insulation and varnishes protect windings against corrosive gases, vapors, moisture, heat... and have high dielectric and mechanical strength for long, trouble-free life.

Louis Allis *climatized* design adds the all-weather protection. The snug but rugged housing and cover will not corrode. Wind-blown rain, snow, sand, and dirt can't get into the motor. The high-volume, low-velocity cooling system breathes air in through screened and baffled right-angle inlets. Thus dust and moisture are not drawn into the motor — nor can foreign matter, bugs or rodents get past the screen. It's extra-quiet, too.

You get duplex-mounted shaft bearings for maximum thrust capacity without misalignment. A self-releasing coupling automatically disengages the pump shaft and eliminates inadvertent damage in case of accidental motor reversal. The motor can be supplied with a non-reverse ratchet that prevents backspin when the motor is shut off and the column of water drains back.

You can choose Louis Allis vertical motors with hollow or solid shaft — in sizes up to 2000 hp. Contact your nearby Louis Allis District Office for application assistance. Or write for Bulletins 2450, 2500 and 2600 to The Louis Allis Co., 449 E. Stewart St., Milwaukee 1, Wis.

OW-205

LOUIS ALLIS

MANUFACTURER OF ELECTRIC MOTORS AND ADJUSTABLE SPEED DRIVES

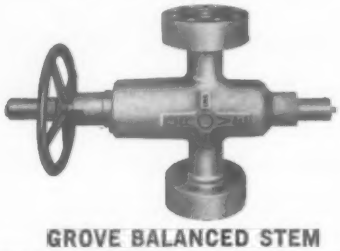
These Grove G-2 Seal-"O"-Ring® Valves
RIGHT OFF THE SHELF

These Grove series G-2 production valves are available right now in most sizes — more coming. They feature Grove Seal-"O"-Ring design and the Grove Valve **big plus** — no lubrication ever!

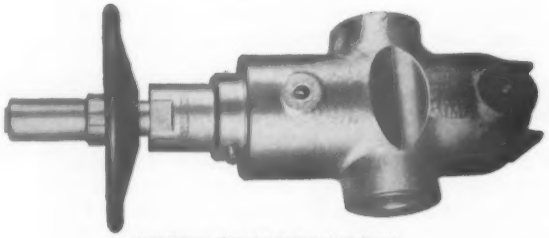
STANDARD GROVE G-2
Right-now shipment of standard series G-2 valves. Available in either flanged or screwed end. Sizes: 1½" through 4". Working pressure: 1000, 2000, 3000 and 5000 pounds.

Write for Bulletin #581

GROVE DUAL BLOCK
Available in 2" — 5000 #W.O.G.



GROVE BALANCED STEM
Available in 2" x 1⅝", 2" x 1-13/16", 3" x 2-1/16", and 3½" x 2-9/16" — 10,000 #W.O.G.



GROVE RECESSED BODY
Available in 1½" and 2" — 2000, 3000 and 5000 #W.O.G.

GROVE PRODUCTION VALVES

GROVE VALVE and REGULATOR COMPANY
A Subsidiary of Walworth
Oakland 8, Calif. • Houston • Los Angeles • Odessa
Tulsa • Denver • Chicago • New York • Dallas
Pittsburgh • Farmington, N.M. • Lafayette, La.
Harvey, La. • Longview, Texas • Oklahoma City • Pampa, Texas • In Western Canada: Grove Valve Ltd., Edmonton

6321

custom tailoring costs less than "ready-to-wear"

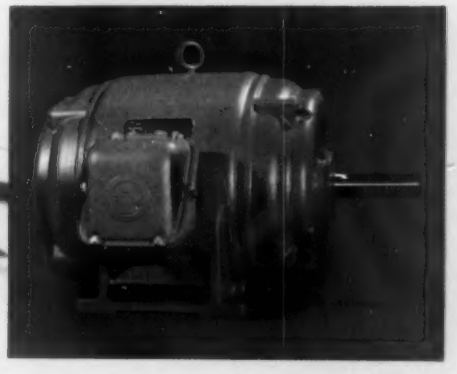
Buying an electric motor with "ready-made" insulation can be a costly luxury.

Motor operating conditions vary so widely throughout industry that Fairbanks-Morse insulation systems are *tailored* to actual operating conditions . . . not *standardized* to "the average".

"Ready-made" insulation systems are an "across-the-board" compromise with *average* operating conditions. When *your* case is the all-too-frequent exception, the compromise is costly.

Even in "hard to fit" cases we build motors rated, dimensioned and insulated to furnish unfailing power. Insulating materials are carefully tested, selected, treated and prepared so that insulation as well as motor enclosure is *matched* to the job. Entire insulation system is custom tailored to meet emergency overloads, temperature extremes, corrosive atmospheric conditions . . . whatever combination of factors affects motor life and performance of your *specific* operation.

This *flexible* application of varied insulating materials and processes "pays off" in low maintenance, uninterrupted production, prolonged service.



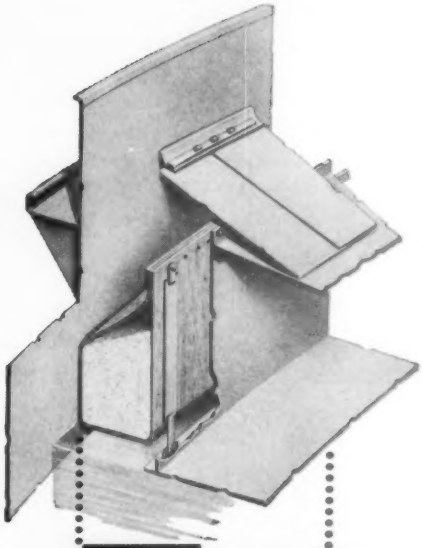
Whatever your motor needs . . . 1 hp or 10,000 hp . . . open or weather-protected . . . vertical or horizontal . . . synchronous or induction . . . AC or DC . . . Fairbanks-Morse builds it, builds it right, builds it to last. Get the facts . . . drop a line today to: Fairbanks, Morse & Co., Freeport, Illinois.

Fairbanks, Morse

ELECTRICAL DIVISION

A MAJOR INDUSTRIAL COMPONENT OF **FAIRBANKS WHITNEY CORPORATION**

FIRST solid cushion seal



When General American developed EverSeal, first solid cushion seal for floating roofs, we wanted a seal that would have these advantages:

1. Simplicity of design, no moving parts, nothing to corrode
2. Permanent, indestructible sealing qualities—no gas or liquid to leak
3. Complete protection of coated tank walls from scuffing or gouging
4. A tough, pliable envelope that would withstand abrasion; ride without damage over projections on the shell
5. Ease of repair or replacement, without taking tank out of service
6. Maximum protection against evaporation loss
7. Full protection of oxygen-sensitive stocks
8. No build-up of vapors in the seal area

EverSeal is the *first* solid cushion seal to meet *all* these requirements. It is made of trapezoidal urethane foam cushions enclosed in a tough, scuff-proof envelope of Buna "N" synthetic rubber and polyvinyl chloride plastic.

EverSeal is almost impossible to damage, always provides a safe and complete seal for every floating roof.

Write or phone your nearest General American office for complete information.

It pays to plan with General American.

EverSeal*

*Patent Rights Reserved

by General American

Plate & Welding Division

GENERAL AMERICAN TRANSPORTATION CORPORATION

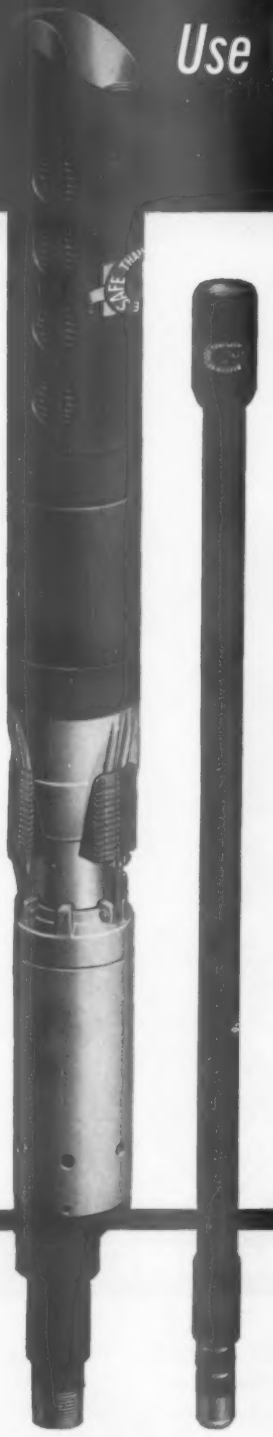
135 South LaSalle Street • Chicago Illinois

Offices in principal cities

PLATE & WELDING DIVISION GENERAL AMERICAN TRADE MARK

For Dual String Completions – Flowing or Pumping

Use GUIBERSON'S RETRIEVABLE TYPE RD PACKER



Type RD Packer with Anchor and Plain Stinger

This cleanly designed, rugged packer is an outstanding Guiberson development for dual string installations in wells of any depth.

Outstanding in performance because it operates perfectly with both zones flowing, high or low differential pressure; with either zone flowing, the other zone pumping; with both zones pumping; with either or both zones on gas lift; or for multi-zone injection — gas or water.

Outstanding in advantages because it completely isolates each zone from the other and from the casing; provides full opening long string to lower zone; permits either string to be pulled or run separately.

Guiberson's RD packer does complex dual zone jobs so well that operators tell us it's their best investment for dual string production. Ask your Guiberson representative about installation and auxiliary equipment recommendations.

Guiberson's RD packer has smooth operating dovetail slips of heat-treated alloy steel. Packing rubber is one-piece sleeve type — will not vulcanize in the well, made of Guiberson's special oil and gas resistant compound. You can get the RD packer with or without anchor, and a choice of stingers, plain or with snap-ring. Piston slips have extra large gripping area, are heat-treated alloy steel and keyed to anchor body up to maintain proper alignment. Get the Best — Get Guiberson.

THE GUIBERSON CORPORATION

ESTABLISHED 1919

DALLAS, TEXAS U. S. A.

Shrinking Dollars

Mean Shrinking Profits

ALWAYS A FULL DOLLAR'S VALUE FROM AJAX

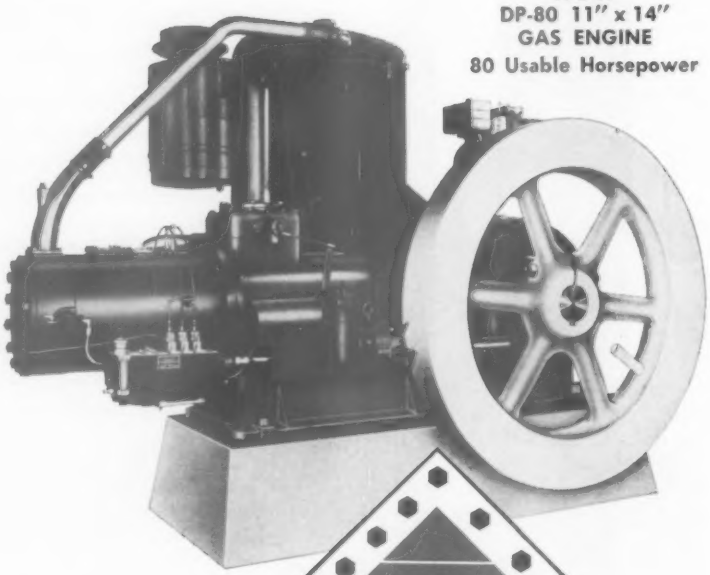
Equipment investment costs are more critical today than ever before.

Awareness of this fact is the reason for the addition to the famous craftsmanship quality line of Ajax Engines of this new intermediate 80 Usable horsepower unit.

With Ajax you don't have to buy more than you need in horsepower to still have a safety reserve and economical operation.

Simple but massive construction for easy low cost maintenance and long life — rugged special clutch for limited attendance — thermo-syphon cooling — are just a few of the full dollar value Ajax features . . .

Introducing the NEW DP-80 11" x 14" GAS ENGINE 80 Usable Horsepower



AJAX

AJAX GAS AND OIL ENGINES

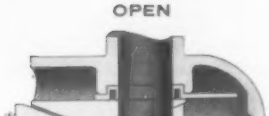
AJAX . . . also builders of COMPRESSORS — PUMPS

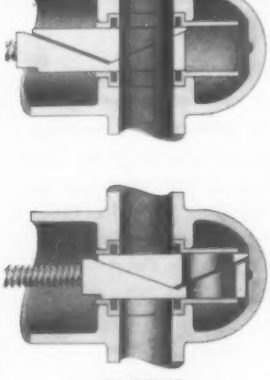
AJAX IRON WORKS CORRY, PENNSYLVANIA

Oil Field Distributors

- The National Supply Co. — Pittsburgh, Pennsylvania
- Bethlehem Steel Co. — Supply Division, Tulsa, Oklahoma
- Mid-Continent Supply Co. — Fort Worth, Texas

OPEN





CLOSED

Get the extra margin of control in W-K-M Multiple Completion Valves

Available in no other integral multiples, the famous W-K-M Parallel Expanding Gate lets you control the *seating force* as well as the action of opening and closing.

This extra margin of control lets you close the valve to *absolute shut-off* . . . open it until the gate assembly is sealed positively against the seats for *perfect through-conduit* flow. Result: *no* turbulence to cause erosion or abrasion.

The extra protection of W-K-M Integral Multiples is the most economical production insurance you can buy.

Types: Duals to 10,000 lb.; Duals with Cross to 5000 lb.; Triples to 10,000 lb.; Triples with Cross to 5000 lb.; Quadruples to 5000 lb.

W-K-M

DIVISION OF acf INDUSTRIES INCORPORATED

P. O. BOX 2117, HOUSTON, TEXAS

6001

The wizard of oil

This National Tube field engineer is a modern-day Merlin, because he designs more economical and more efficient casing combinations.

He does it without magic or sleight-of-hand, but with years of field experience and technical knowledge. He figures several casing combinations with razor-sharp accuracy, lists them on a form, and submits it to a customer. The customer then picks the combination that best fits his program—in this case it was combination "a."

Our field expert carefully explores the customer's operating methods. Does he run his string fast or slow? Type of equipment? Drilling technique? Location? If it's an offshore

SAFETY FACTOR (MIN.)				
COLLAPSE[1] BOTTOM OF SECTION	TOP OF SECTION			COMBINATION
	TENSION	PIPE YIELD STRENGTH	INTERNAL PRESSURE (YIELD)	
1.82	2.87	1.61	1.00	
1.13	2.00	1.72	1.00	a
1.13	3.72	3.28	1.11	
1.23	8.56	8.02	1.61	
High	2.87	1.61	1.00	
High	2.00	1.47	1.00	
1.13	2.00	1.72	1.00	b

project, he'll include an extra safety factor. This engineer's strict attention to detail results in a casing combination that promises efficient, economical and satisfactory service.

A great many customers have benefited from our experience. You can too. National Tube is the world's largest and most experienced manufacturer of tubular products. Write National Tube Division, United States Steel, 525 William Penn Place, Pittsburgh 30, Pa.

USS and National are registered trademarks

National Tube Division of United States Steel

Columbia-Geneva Steel Division, San Francisco, Pacific Coast Distributors
United States Steel Export Company, New York

Hydra Hook
W W
Pick the finest
ALL FROM ONE MANUFACTURER
BAASH-ROSS
BAASH ROSS TYPE
W W
CONTACT YOUR
BAASH-ROSS REPRESENTATIVE
BAASH ROSS DIV
OUR 41ST YEAR OF PROGRESS
Baash-Ross and Web Wilson Tools are sold only thru supply stores
JOY
BAASH-ROSS
DIVISION OF JOY MANUFACTURING CO.
General Offices: Houston, Texas

BETTER drilling rates in all types of muds: T-8, lime, gyp, and low pH, with varying amounts of oil.

BETTER (lower) barite requirements when substituted for oil in muds.

BETTER hole lubrication, in all types of muds, to reduce pipe sticking.

BETTER bit bearing life **even in high solids muds.**

BETTER geological interpretation and electrical logs; no fluorescence.

PLAN WITH BIT LUBE to drill 5 ways better . . .

MAGCOBAR PLANNED MUD PROGRAMS make the above statements facts, not claims. In high weight emulsion muds, for example, the Magcobar engineer properly substitutes Bit Lube® for some of the oil to cut drilling costs by reducing the amount of barite required. In a typical well, the oil content of the mud was allowed to drop from 11 to 5 per cent. Bit Lube was added to this 17.8 lb./gal. lime mud with these savings in barite:

	Sacks of barite per day	Cost of barite per day	Cost of Bit Lube per day	Cost of Oil per day	Total Cost per day
Emulsion (2 week average)	177	$409.76	$—0—	$74.03	$483.79
Bit Lube and Emulsion (3 week average)	52	120.38	122.43	8.25	251.06

NET DAILY SAVINGS WITH BIT LUBE: $232.73

Not only does Bit Lube give direct cost savings, but it also offers escape from costly pipe sticking, even in extreme directional holes. Bit Lube lowers the friction coefficient of the mud, to give over-all higher drilling mud performance. These savings can be added to those in the chart.

The skilled use of good products like Bit Lube to cut drilling costs is the heart of Magcobar Technology. Let the Magcobar engineer plan the mud program for your next well and this Technology will save for you all along the line.

Magcobar
Complete
DRILLING MUD SERVICE

DRESSER INDUSTRIES, INC.
OIL • GAS • CHEMICAL
ELECTRONIC • INDUSTRIAL

SEAL OFF and

SUSPEND . . .

everything but

profits . . .

The Cameron "CA" Casing Hanger can make a big difference in one important phase of your completion plans. The "CA" can swiftly, safely and securely seal off and suspend casing in any length, size or pressure range you put in your well.

Because it is entirely automatic and will not bottleneck at pipe loads equivalent to API joint strength, your profit picture stays in focus.

Plan your next completions with Cameron "CAs" (if you haven't already) and you'll know the best reason why we sell so many. "CAs" are available throughout the oil producing areas of the world.

They are ready when and where you are ready to seal off and suspend anything but profits.

Cameron

IRON WORKS, INC.

P. O. Box 1212 — Houston, Texas

Export Office: 7912 Empire State Bldg., New York City. In England: Cameron Iron Works Ltd., 76 Grosvenor St., London W. 1 England.

DRILL

WITH

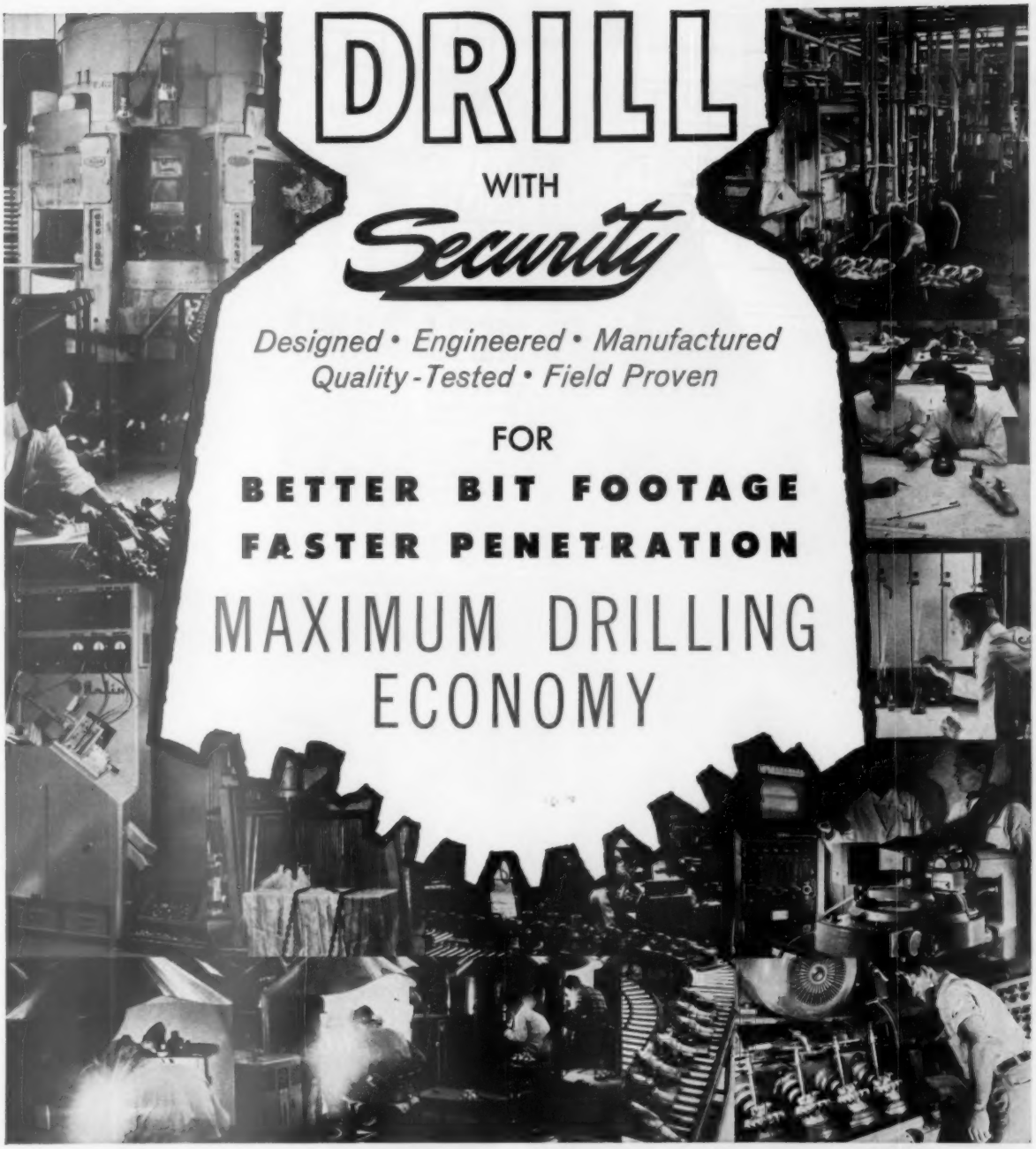
Security

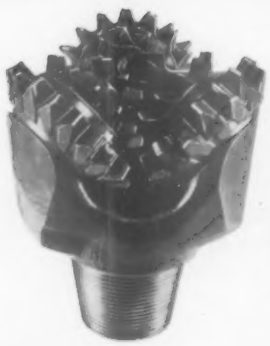
Designed • Engineered • Manufactured
Quality-Tested • Field Proven

FOR

BETTER BIT FOOTAGE
FASTER PENETRATION

MAXIMUM DRILLING ECONOMY





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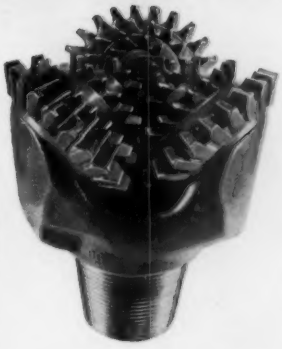

OPTIMUM
COMPLETION
TECHNIQUE
WE'LL ADMIT
there are many claims about many wellhead hook-ups and components. But if you want to take the puzzle out of your production equipment, ask the O-C-T representative nearest you about "The Standard." It is simply a combination of an O-C-T Casing Head, O-C-T Tubing Head, master valve of your choice, and O-C-T flow control.
O-C-T Casing Heads are designed for flexible application under every well condition and feature increased economy through safety and rig-time savings.
O-C-T Tubing Heads are available with complete ranges of hangers. An example is the popular "T-16," a full open type with API flanges to receive flanged blowout preventers or master valves to permit the hanger to be landed. It is adapted to receive the threaded "T-16" Hanger or alternate types.
O-C-T Flow Controls combine in an integral, one piece casting, a device performing the functions of a tree cross or tee, wing valve, adjustable or positive choke and the upper bottom hole pressure connection adapter. These Flow Controls effect economies in cost and weight.
In the "O-C-T Standard," simplicity, durability and economy are built-in features.
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SUBSIDIARY OF FOOD MACHINERY AND CHEMICAL CORPORATION
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TWO NEW MONEY SAVING TOOLS FROM BJ SERVICE!

Mechanical Collar Locator Accurately Positions Tubing in the Well

A natural companion to the Notch Jet Perforator, this rugged BJ Service tool locates the bottom of your tubing in any cased well. It allows you to run tubing at the normal speed—doesn't slow down your operation. It can locate any casing collar as many times as desired. In addition to working with the Notch Jet, the Mechanical Collar Locator gives accurate information for such critical operations as setting packers, testing and squeeze cementing.

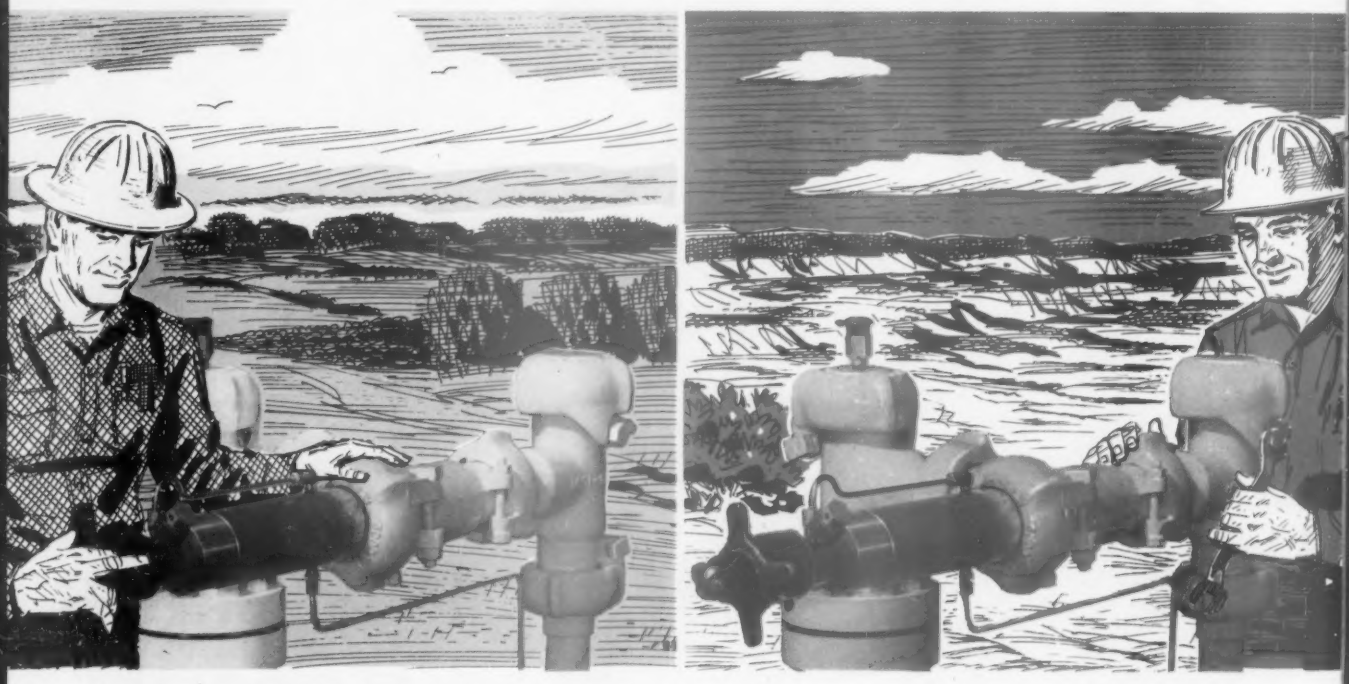
Notch Jet Hydraulic Perforating Tool for Better Fracture Initiation

New development from BJ Service gives you the desirable wedge-shaped notch for single point entry fracturing. The Notch Jet is faster, more efficient and less expensive than wire line or mechanical cutting tools. A new development by BJ Service engineers, Notch Jet angles the sand-laden fluid to avoid splash-back—gives deeper, cleaner penetration!

BJ SERVICE, INC.

A BORG-WARNER SUBSIDIARY • LONG BEACH, CALIFORNIA • ARLINGTON, TEXAS

ONLY THE NEW UNIBOLT IS BOTH A WING VALVE AND



As a wing valve, it opens and closes manually for choke changing.

Here's how this one valve does the work of two... for little

Stated simply, the new UNIBOLT Pressurematic Valve is an adaptation of the tried and proven UNIBOLT Adjustable Wing Valve with an added automatic closing feature. (Any of the thousands of Adjustable Wing Valves now in Christmas tree and other services may be readily converted to "Pressurematics" by replacing the standard stem/bonnet assembly with the new automatic assembly).

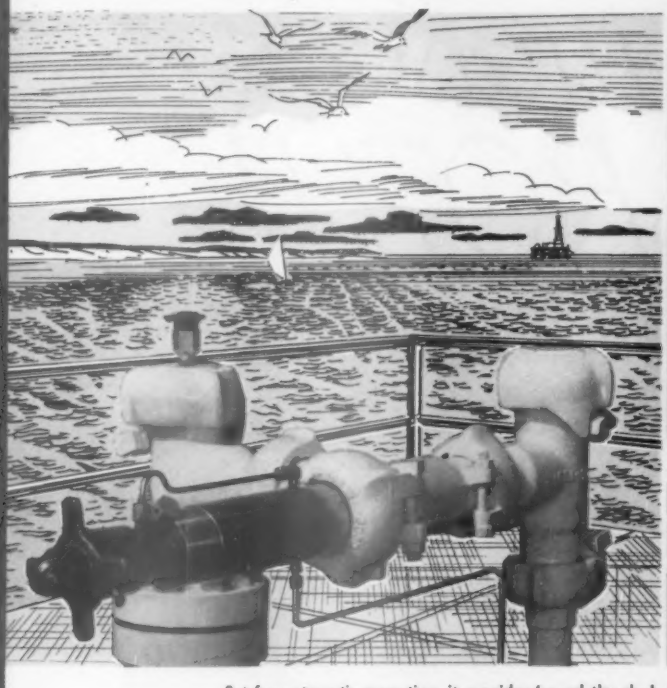
Heretofore, in order to protect a well against broken flow-lines and similar mechanical failures that would permit the well to flow wild, an automatic "high-low" valve has been installed in the manifold beyond the wing valve. Now, a single Pressurematic Valve not only safeguards the well against these hazards but also serves as a fine, easy-operable wing valve.

NO SPRINGS — The Pressurematic design is preferred by many operators because it employs no springs in its actuating mechanism. The design is simple and trouble-free. An ages-old engineering principle, that of balancing a large diameter piston under low pressure against a small diameter piston under high pressure, has been incorporated in the design of the Pressurematic Valve. In this case, high well head pressure acts against a small diameter piston which is balanced against the relatively low flow-line pressure acting against a larger diameter piston.

PRESSURE SURGE OR DROP CLOSES VALVE — Once the well head and flow-line pressures are established, it is an easy matter to select the proper sizes of pistons required for balancing. Then, when pressures rise or fall beyond predetermined limits, the valve closes instantly, automatically. For example, a broken flow-line would cause the flow-line pressure to drop sharply and the Pressurematic Valve would close instantly, automatically.

PRESSUREMATIC VALVE

A HIGH-LOW SAFETY VALVE



Set for automatic operation, it provides 'round the clock protection.

PATENTED AND PATENTS PENDING

more than the price of one:

CLOSES EASILY BY HAND FOR CHOKE CHANGING — Unlike all other "high-low" safety valves, the Pressurematic Valve is an excellent Christmas tree wing valve. A few turns of the handwheel closes it for choke changing. Then, the valve is opened and set for automatic operation by further manipulation of the handwheel. Like the UNIBOLT Adjustable Wing Valve, the seat in the Pressurematic Valve is large enough to pass practically any desired quantity of oil or gas. And, the entire automatic assembly is corrosion-resistant stainless steel. Stems and seats of special analysis steel, specially heat-treated, are also available.

IT SAVES YOU MONEY — This combination automatic shut-off and wing valve costs little more than the price of a good wing valve or a conventional "high-low" valve alone.

Descriptive literature will gladly be sent on request.

UNIBOLT

THORNHILL CRAVER CO.

P. O. BOX 1184 HOUSTON, TEXAS

SEAMLESS

- Long radius or short—the finest ells ever made ... **hot coined** for dimensional accuracy from end to end
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- Produced by newest, most modern equipment, combined with latest technology in forging, sizing, heat-treating and machining

Now... Midwest makes BOTH!

The world's most complete line of welding fittings... for maximum flexibility in piping design

- Formed from plate and welded—**fully reinforced** . . . same high quality as always
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Non sticking. Self-adjusting operator compensates for variable temperature. Will not stick on coking services.

Protected seats prevent valve-killing erosion of dry and fluid catalysts—a constant problem and expense when gate valves are used. With Wedgeplugs, you eliminate this extra maintenance cost.

Wedgeplugs are proven performers on such services as hydrocarbon vapors at 900°F and 600 psi; fluid catalysts at 1125°F and 225 psi; and hydrogen at 900°F and 300 psi. Wedgeplug valves can be supplied in alloy steels as service demands.

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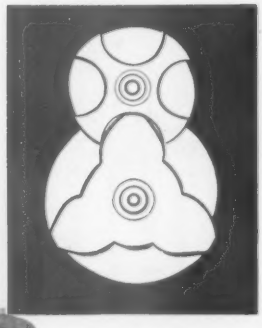

From the LARGEST

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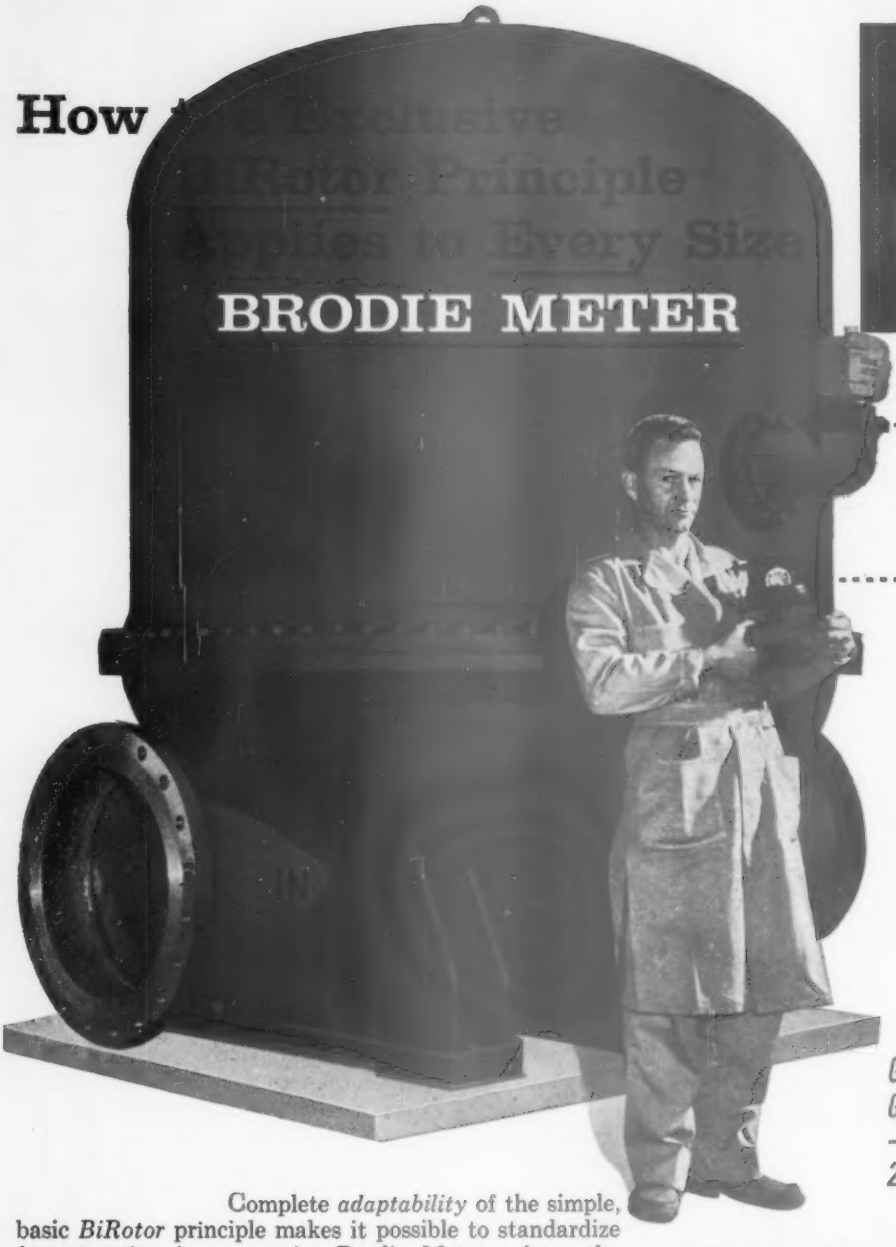

Giant in Size
Giant in Capacity
—it cruises at
20,000 bbls. per hour.

Complete *adaptability* of the simple, basic *BiRotor* principle makes it possible to standardize for operation in every size Brodie Meter – from the smallest to the largest! The large size *BiRotor* "cruises" at 20,000 bbls. per hour.

BiRotor...its true rotary action means no oscillating or reciprocating parts...no pulsations in the stream, and no vibrations. There is no mechanical friction in the measuring chamber to cause wear. The welded all-steel double-case construction prevents line shock and strain from impairing measuring accuracy. These are the factors that are the basis for the *BiRotor's* sustained accuracy in *every size* and on *every job*.

As a result – you don't baby a Brodie *BiRotor* – it operates up to full rated capacity. Call Brodie specialists for every metering requirement up to 20,000 bbls. per hour.

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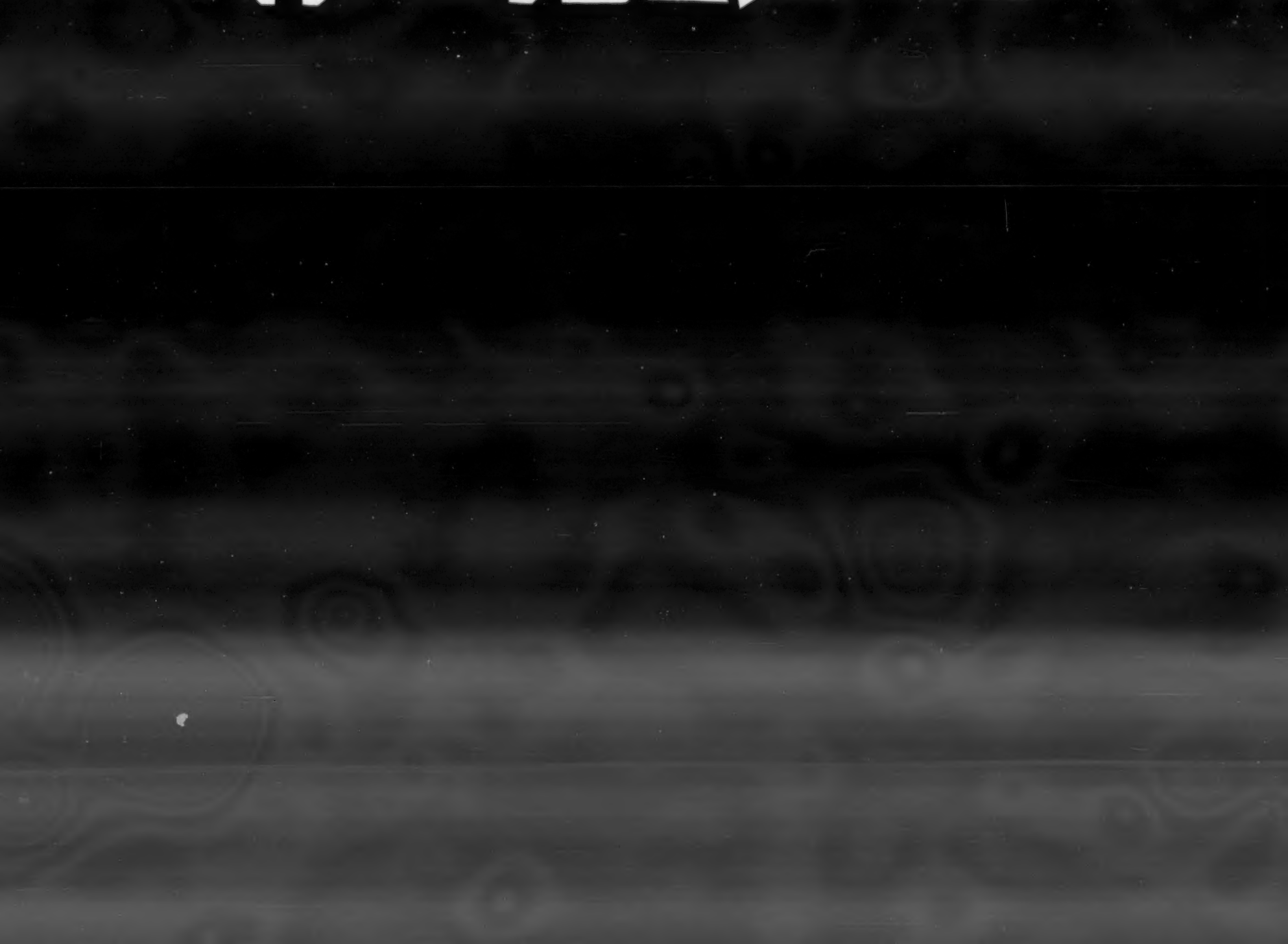
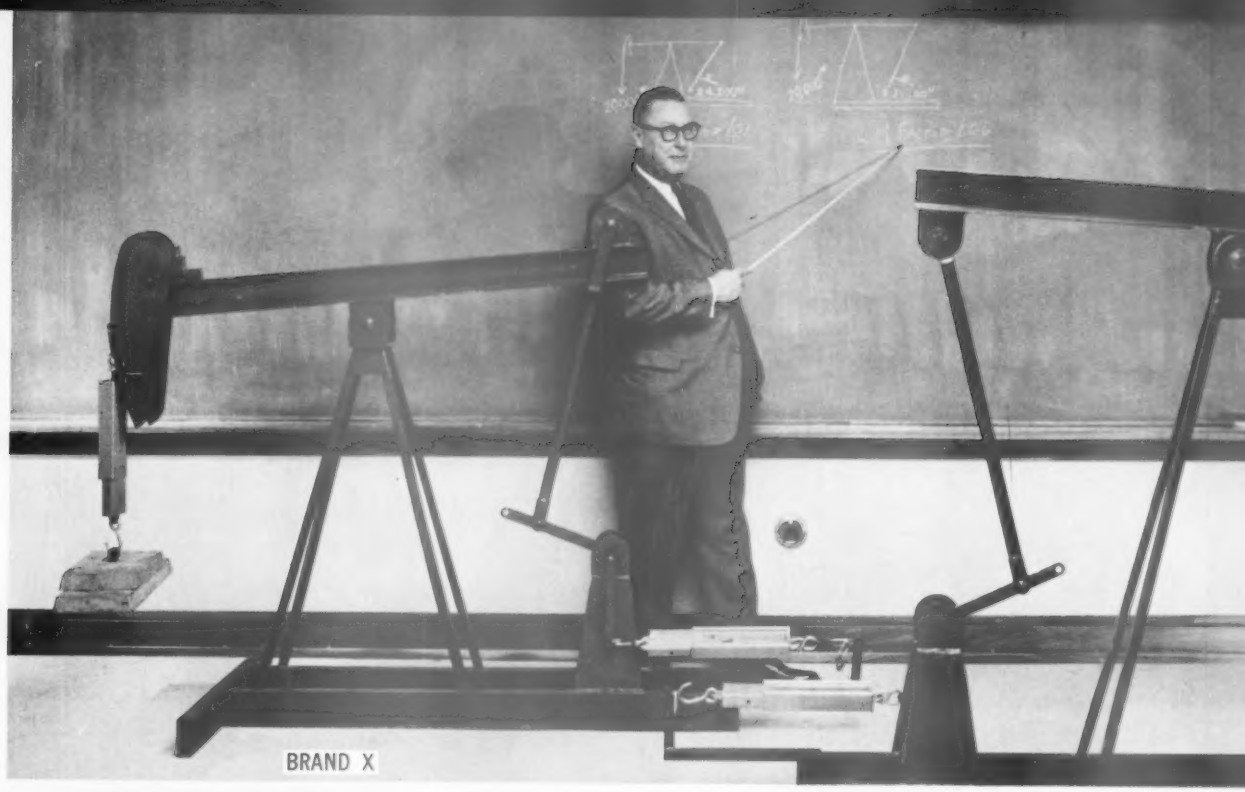
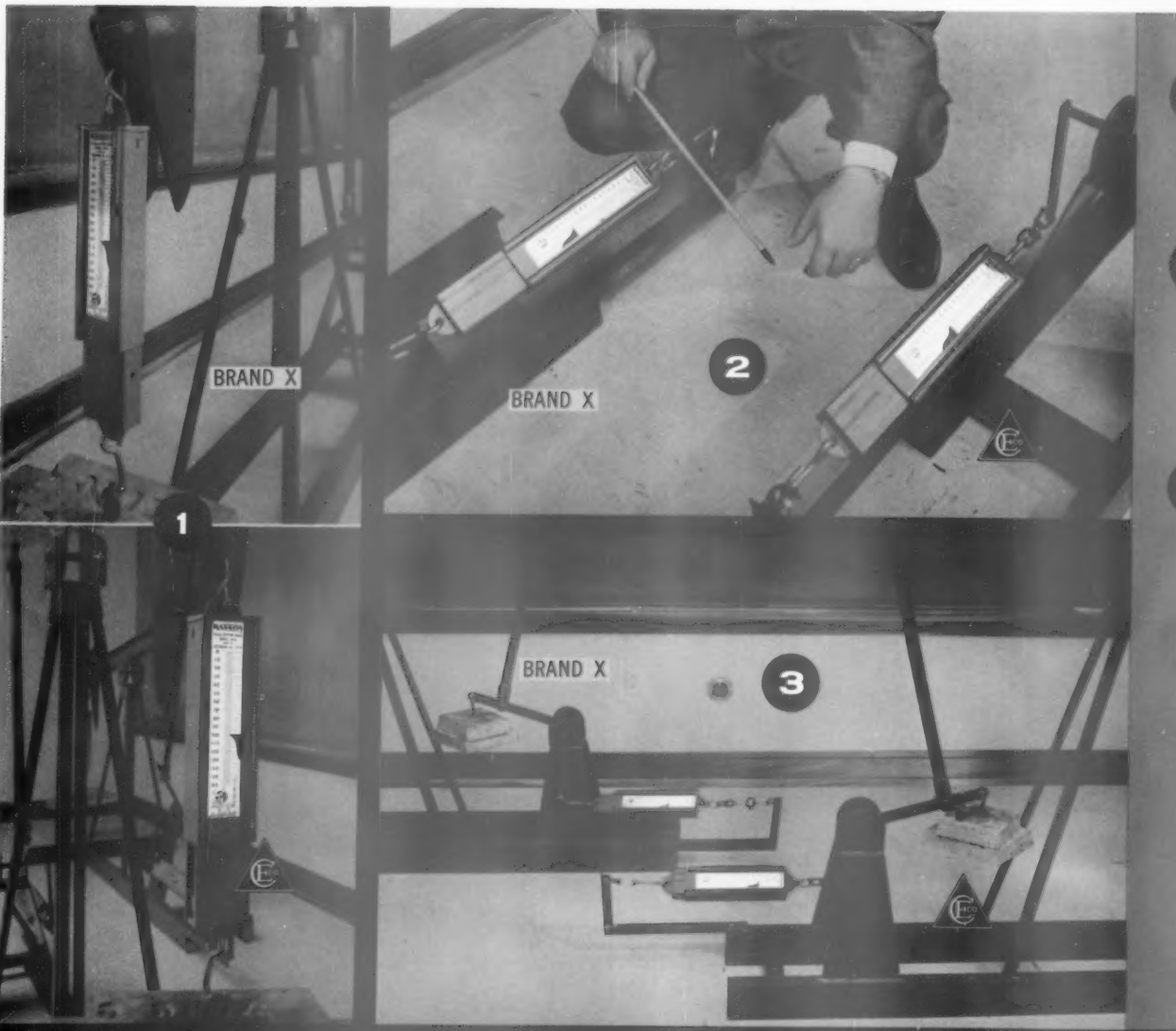



BRAND X


BRAND X
1
BRAND X
2
BRAND X
3

1

These two close-ups show spring scales on the two models in the large photograph. Both read 100 lbs. "well loads".

2

Spring scales attached to the wrist pins of the two models read: 102 lbs. for the C-E-type model on the right; 119 lbs. for the brand "X" on the left *. . over 16% greater wrist-pin load.*

3

With the well load remaining 100 lbs., 50 lbs. of actual counter-balance were added to each unit. The net load at the wrist pin on the C-E reads 34 lbs., while brand "X" reads 51 lbs., a 50% greater bearing and torque load. Obviously the efficiency of C-E's properly-designed unit pays off in lower operating costs, less wear on bearings and gear-teeth, and lower power costs —without over-sizing or purchasing added counterbalance effect.

THIS SIMPLE DEMONSTRATION

. . makes it easy to see how C-E's low LMF (Load Multiplication Factor) cuts your operating costs.

See the two model units in the large photograph? The one on the right conforms to Continental-Emsco's design principles. Note its taller samson post. See how its added height reduces the angle between the pitman and a true vertical line. The smaller this angle, the less is your Load Multiplication Factor. This means you're pulling more vertically and more efficiently, as you'll see in the following example:

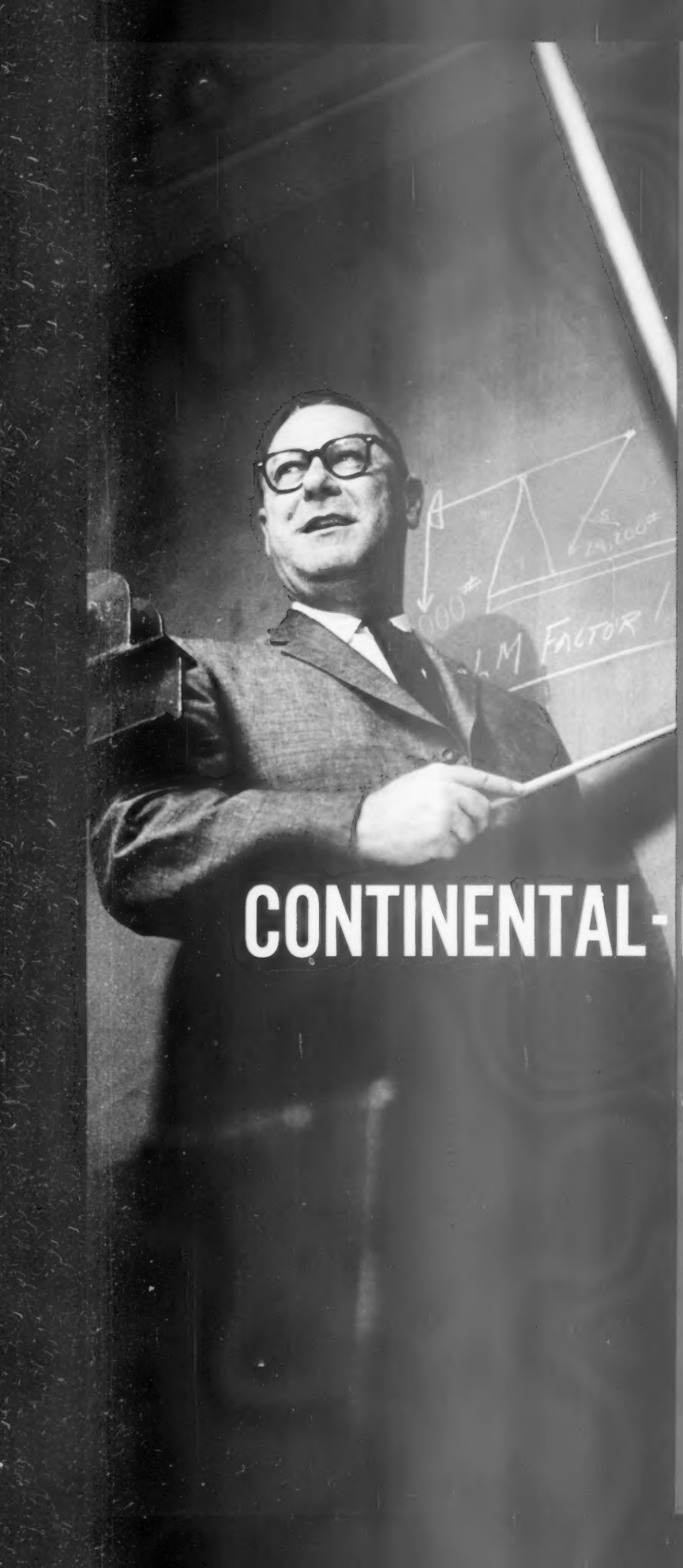
On the two models shown, a "well load" of 100 lbs. is applied. With the C-E-type model, the wrist-pin load is only 102 lbs. — a 1.02 Load Multiplication Factor. On the brand "X" model, the wrist-pin load is 119 lbs. for a 1.19 LMF. Seventeen pounds difference. Not much? It represents 16.6% more loading than on the C-E-type model.

To illustrate the advantages of good design, this demonstration is slightly exaggerated, to be sure . . but only slightly. Let's examine the figures from typical full-size unit pumpers and see what the LMF actually can mean to you:

On a 20,000 lb. well, a Continental-Emsco unit pumper with its LMF of 1.06 at its maximum stroke will produce a wrist pin load of only 21,200 lbs. Consider a competitive make with a 1.21 LMF actually being sold today. Here the same well load is increased to 24,200 lbs. at the wrist pin . . a ton and a half greater. Imagine the extra wear on gears, the excessive peak loads on purchased electric power, and the undue strain on belts and bearings!

Now you can see why so much time and effort went into the development of C-E's unit pumper design . . *to offer you the industry's lowest Load Multiplication Factor throughout the line.*

If you speak for your company's management, engineering, or purchasing departments, you should investigate the *many profit advantages* you gain with Continental-Emsco unit pumpers. Make it a point to see your C-E representative or write direct.



LET'S TALK

ABOUT CONVERTING LIFTING COSTS INTO

PUMPING PROFITS

WITH

CONTINENTAL-EMSCO UNIT PUMPERS

Designed to meet the API standards

ST

JPT 02
PRINTE

NOW LET'S TALK TRUCTURALS

In this unretouched double-exposure, you can see the advantages of Continental-Emsco's *triangular* samson-post design. Here, a load is held solidly by C-E's design, while a platform-type design buckles and flexes under the same load. The two units built of identical materials, are not scale models, but were constructed to demonstrate design principles. Here is a typical result of Continental-Emsco's Research & Development program . . continuing research into better methods of handling your well loads and power requirements with the *utmost utilization* of *each pound* of material.

OTHER FEATURES THAT SPELL ADDED RELIABILITY

PLUS WORLD-WIDE SERVICE AND SUPPLY . . backed by 134 stores and offices

FOUR-LEG TRIANGULAR CONSTRUCTION eliminates weaknesses caused by platform type samson-post design.

SUPERIOR LUBRICATION. Oil troughs cast in reducer case make inspection easier and provide ample amounts of oil at all speeds in both directions of rotation. Structural bearing lubrication available as follows: (1) Standard, from safety ring and ladder (2) ground lubrication (3) prelubricated and sealed at the plant.

BOLT-ON WRIST PIN HOUSINGS cut time for field assembly and stroke-length changes . . make them easier, too. Bolts assure accurate alignment. Pins are hydraulically removable.

B-10 BEARING RATINGS are your assurance of longer bearing life. Another C-E "first."

STANDARD QD SHEAVES cut cost and save time, since they are lower in price and readily available everywhere.

GROUND-LEVEL COUNTERWEIGHT ADJUSTMENTS make well balancing a simple, quick, safe . . and profitable job.

SERVICE BRAKE is a powerful, internally-expanding type and is located opposite drive sheave for easier adjustment and repairs.

VARIETY OF BASES AND SKID EXTENSIONS meets all prime-mover requirements and setting variations.

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Better products, *faster*, from your Federal-Mogul jobber:

Federal-Mogul Engine Bearings keep power at a peak longer... over the road or in the fields!

"Jewels of the engine" and first choice of skilled mechanics who know the value of perfect oil control for long-life service

Whether your operation calls for portable rigs or stationary power, your engines must deliver full output to transport heavy equipment or for drilling. Federal-Mogul sintered engine bearings are precision-made to stand the shocks and give good service under all conditions. They are made under a patented process in five layers . . . 1. Steel back for strength and bond; 2. Copper-lead sintered lining; 3. Brass barrier for stability; 4. Lead-tin overplate for smoother "break-in"; 5. Pure tin flash plating for corrosion resistance.

Let your nearby jobber supply you with these longer-life, quality bearings for all replacements. He'll see you get fast service.

FEDERAL-MOGUL ENGINE BEARINGS

BEARING FEDERAL Mogul SERVICE

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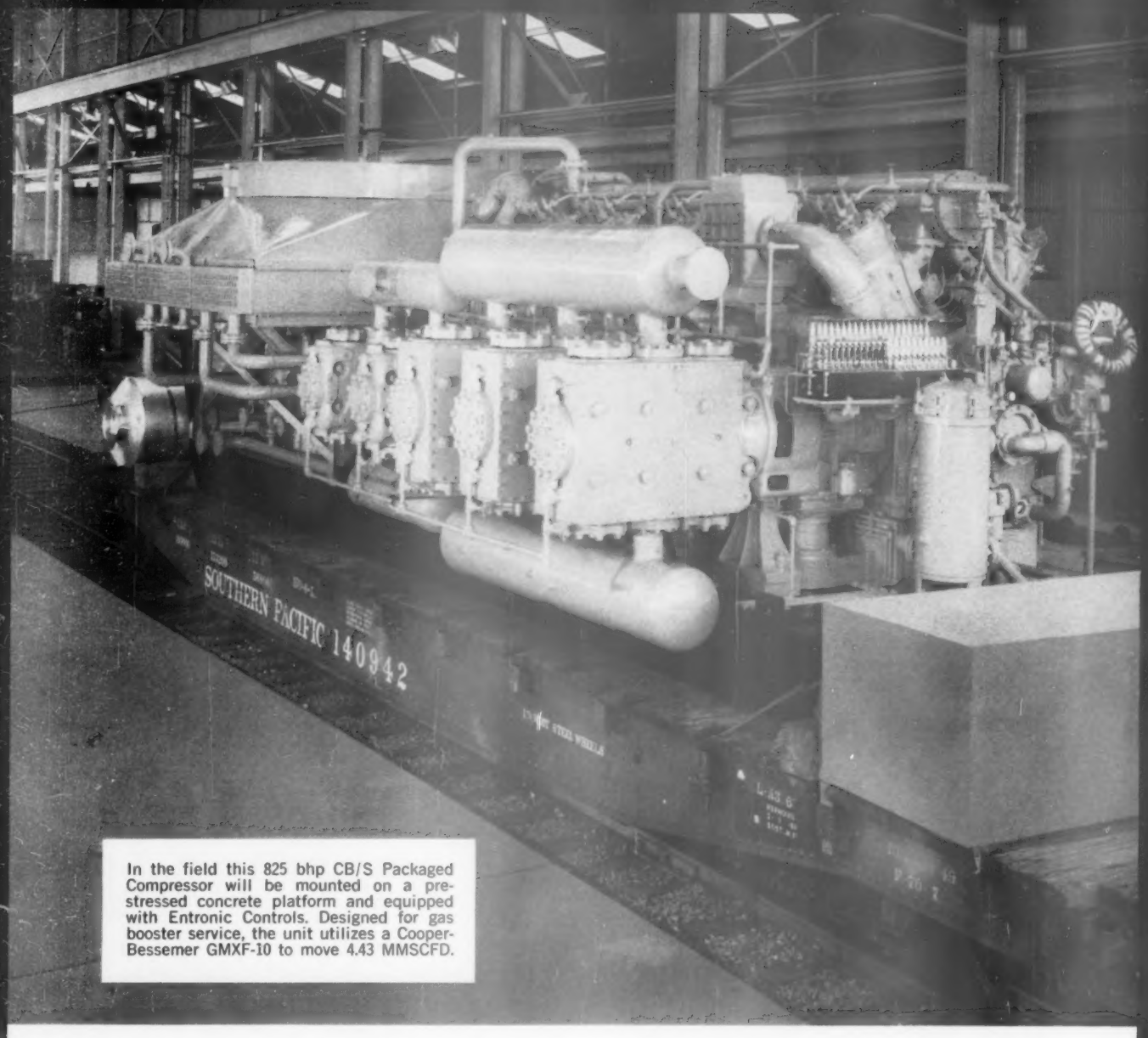
DIVISION OF FEDERAL-MOGUL-BOWER BEARINGS, INC. • DETROIT 13, MICHIGAN



In the field this 825 bhp CB/S Packaged Compressor will be mounted on a pre-stressed concrete platform and equipped with Entronic Controls. Designed for gas booster service, the unit utilizes a Cooper-Bessemer GMXF-10 to move 4.43 MMSCFD.

Building packaged compressors is our business . . . our only business. This single objective is the reason CB/S Packaged Compressors are more advanced in design . . . more efficient in the field.

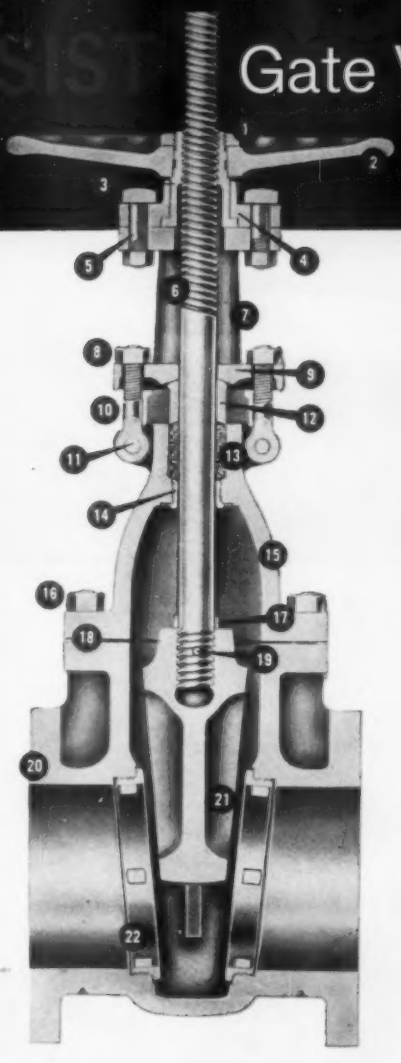
CB/S
PACKAGED
COMPRESSORS

CB/S

C-B SOUTHERN, INC., P. O. BOX 19267, HOUSTON 24, TEXAS

A subsidiary of The Cooper-Bessemer Corporation.

You extend valve life in Corrosive and Erosive services TWO WAYS when you Specify for Gate Valves, too



No. 1... when you specify "Jenkins" you get not merely "Ni-Resist" metal but you get Type 2 Ni-Resist Cast Iron! That affords extra resistance to acids, salt and alkaline solutions, sea water, brine and other corrosive and erosive fluids, vapors or gases. It is copper-free and will not contaminate or discolor the materials controlled.

Type 316 Stainless Steel is used for the wedge, spindle and other trimmings to give you a combination of metals which have remarkable ability to withstand destructive service.

No. 2... you get all the excellence which the Jenkins Diamond trademark has represented for nearly a century. The superior design and construction are visible here. Equally important superiorities which show up only in the records of long service and low maintenance are the close grain and high density of Jenkins castings ... the precision of Jenkins machining ... the rigid inspection and testing which every Diamond-marked valve undergoes.

It costs no more to buy Ni-Resist Gates made by Jenkins. And, it may cost much less to USE them. Write us, or ask your Jenkins Distributor for information folder No. 205.

1 Bronze yoke bushing nut
2 Handy grip iron wheel
3 Bronze yoke bushing
4 Iron yoke cap with zerk fitting for lubricating bushing
5 Steel yoke cap bolts and nuts
6 TYPE 316 STAINLESS STEEL spindle
7 NI-RESIST CAST IRON, TYPE 2, yoke
8 Bronze eye bolt nuts
9 Malleable iron gland flange
10 Steel gland eye bolts
11 Steel gland lug bolts and nuts
12 TYPE 316 STAINLESS STEEL gland
13 Teflon impregnated asbestos packing
14 TYPE 316 STAINLESS STEEL bonnet bushing
15 NI-RESIST CAST IRON, TYPE 2, bonnet
16 Steel bonnet bolts and nuts
17 TYPE 316 STAINLESS STEEL spindle ring
18 Asbestos gasket
19 TYPE 316 STAINLESS STEEL wedge pin
20 NI-RESIST CAST IRON, TYPE 2, through-port body
21 TYPE 316 STAINLESS STEEL solid I-beam wedge
22 TYPE 316 STAINLESS STEEL seat rings

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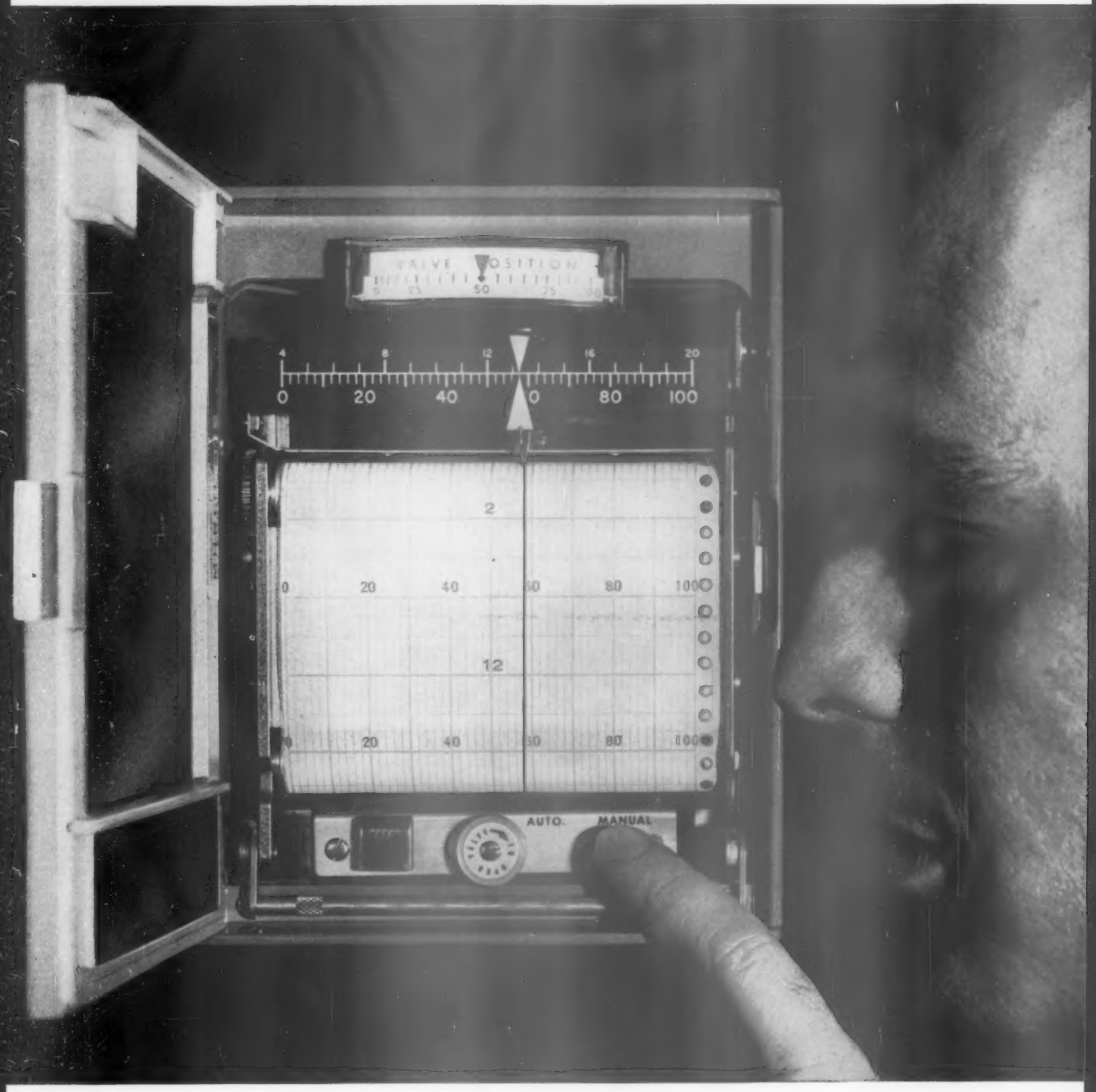
New *ElectriK Tel-O-Set*... needs in a single compact



everything an operator control station

This Honeywell electric control station meets all of your requirements for operator convenience.

One compact case houses *every* function the operator needs to supervise a control loop: indication of process variable and set point on the same scale; the controls needed to switch from automatic to manual; controls for manual control; and indication of valve position.

The *ElectriK Tel-O-Set* control station assures easier bumpless transfer than ever before available because there's no need to "line up" or "match" pointers. A null balance indicator eliminates guesswork, and the transfer doesn't have to be hurried since the valve remains under control during the transfer.

You can also order the controller with the proportional band, rate, and reset adjustments on the front of the panel conveniently located below the control station, or at the rear of the panel.

These are just a few of the features that make the new *ElectriK Tel-O-Set* control system an outstanding value. Your Honeywell engineer can give you complete details. Call him today . . . he's as near as your phone.

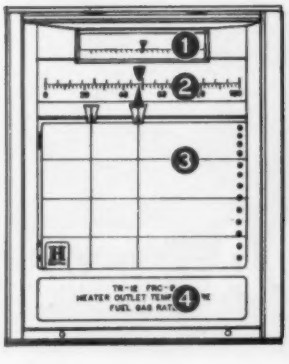
MINNEAPOLIS-HONEYWELL, Fall River, Massachusetts.

75th YEAR — PIONEERING THE FUTURE

Honeywell

First in Control

SINCE 1885

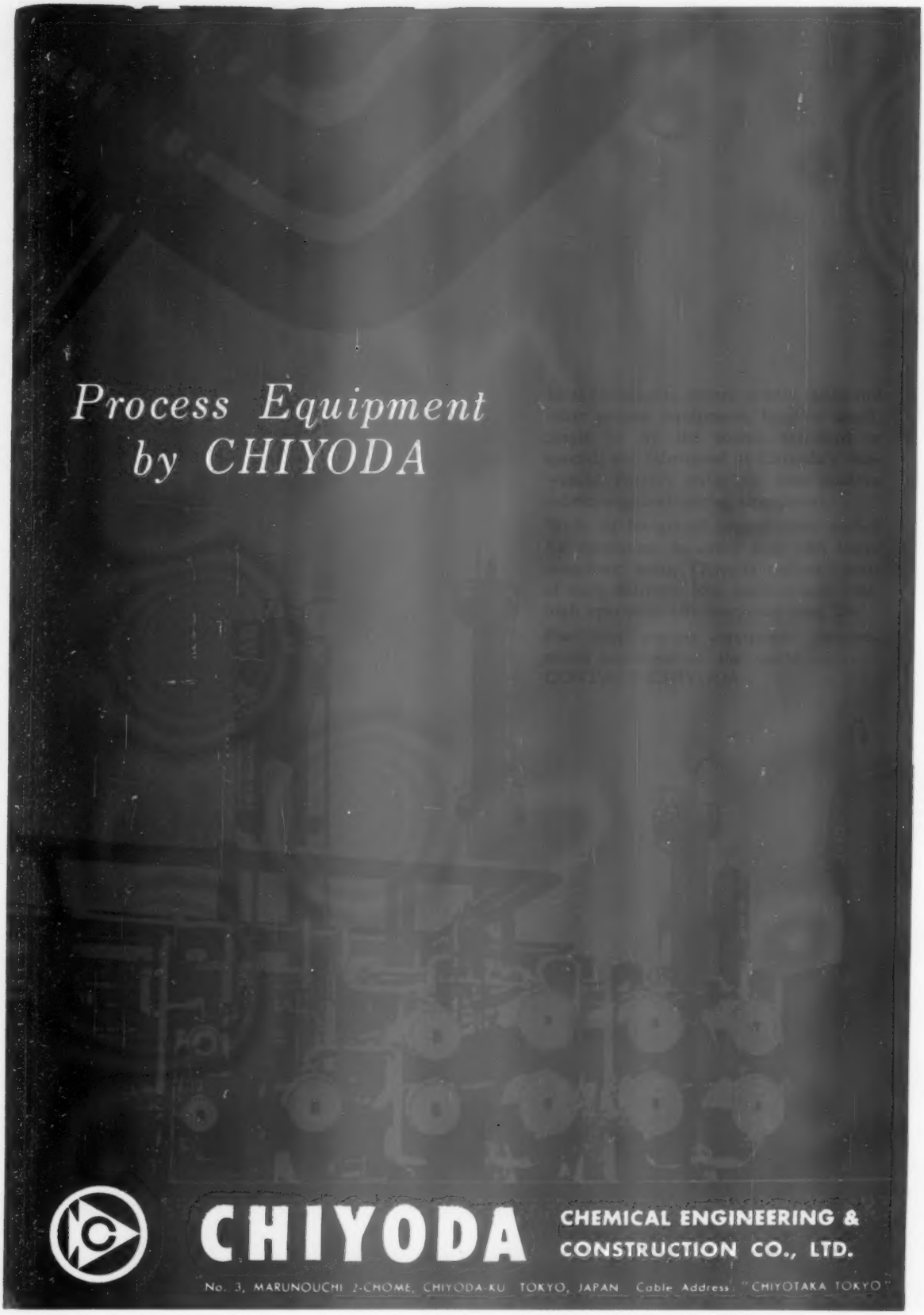


1. Valve position indicator continuously indicates controller output when on automatic control.

2. Set point index is conveniently located on same scale as process-variable pointer; you can see from a distance any deviation of variable from set point.

3. Rectilinear 4-inch calibrated chart is easy to read. At standard chart speed, four hours of recording is always visible. Unit has daily chart tear off or 30-day rewind. Both recorder and control station take the same 5½" x 6" panel cutout.

4. You get bumpless switching from automatic to manual control because you don't have to match pointers. In the balance position, the valve position indicator is part of a null circuit that compares controller output and manual output. When indicator reads 50%, both outputs are perfectly matched.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Cutaway of Wilson Jet-Powered Junk Retriever. Complete specifications and operations available in booklet form.

Great Western Drilling Co. Rig #44 on deep test for The Atlantic Refining Co., Kelly #1, Pecos County, West Texas.

(Left to right) J. D. Mosley, toolpusher, Great Western Drilling Co., Rig #44; P. E. Todd, Wilson Supply Fishing Tool Division, Odessa, Texas; Bob Foster, driller, Great Western Drilling Co., Rig #44.

Wilson "Jet-Powered" Junk Retriever Cleans 18,121 ft. West Texas Hole

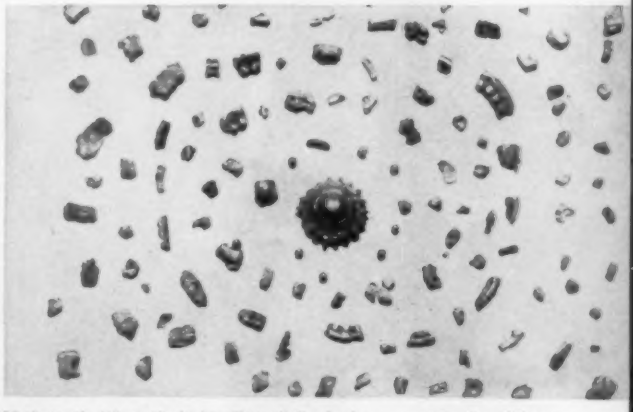
Only on bottom for 4½ hours recovering bearings and 4⅛" rock bit cone

A 3⅝" Wilson "Jet-Powered" Junk Retriever on 2⅜" Internal Flush Drill Pipe was run to 18,121 feet to recover junk and rock bit cone in a deep West Texas drilling test. The Wilson Junk Retriever was on bottom for 4½ hours and successfully cleaned the hole.

Two 700 hp pumps at 2000# produced only 110 gallons of fluid per minute through the 1" I.D. (2⅜" O.D.) pipe on which the Wilson Junk Retriever was run. Even with this small volume of fluid the tool's built-in ejector pump functioned properly and forced the 4⅛" bit cone and other miscellaneous junk into the tool's sleeve.

This is just one of many successful fishing jobs recorded by the Wilson "Jet-Powered" Junk Retriever. The tool is simple to operate, effective in performance and is available for use by all recognized fishing tool companies. In this instance the tool was run by M & B Fishing Tool Co. of Odessa.

The next time you have a junk-removal problem, call WILSON. You'll save time and money . . . and you'll get the **right** men with the **right** tools to handle your fishing job safely — quickly.



Photograph taken at rig location of the junk removed by the Wilson Junk Retriever at 18,121 ft.

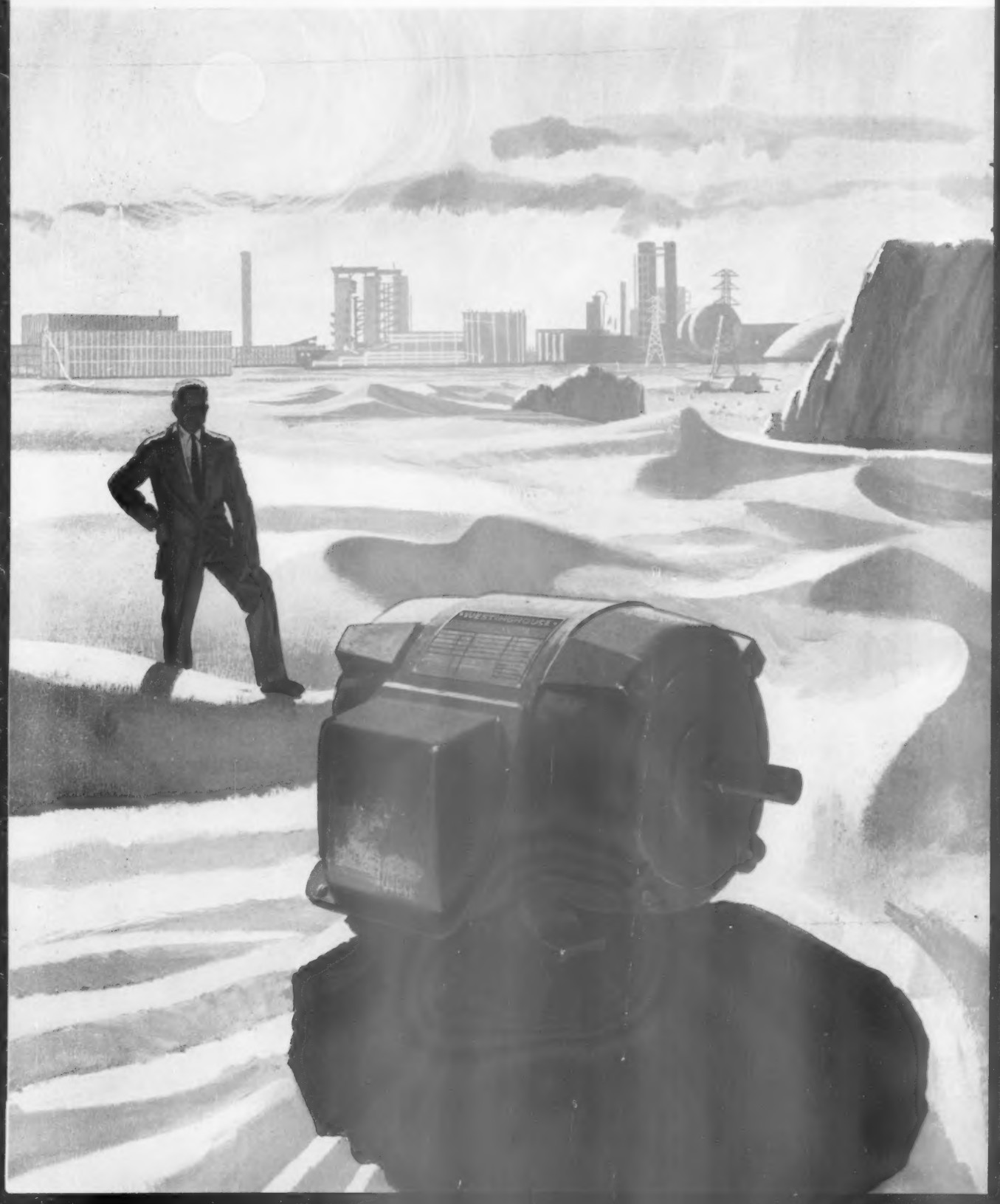
MAIN OFFICE and WAREHOUSE • 1301 CONTI STREET • HOUSTON, TEXAS
INTERNATIONAL DIVISION • 45 ROCKEFELLER PLAZA • ROOM 1701, NEW YORK

WILSON SUPPLY CO
HOUSTON TEXAS

60

New Guardistor

THE MAN & THE MOTORS



FROM WESTINGHOUSE

Guardistor motors let you match the full capability of the motor to the job— with complete safety—absolute confidence

Our Marketing Manager says:

- "You can match the motor to the load . . . use all the motor you are paying for.
- Provides positive protection based on winding temperature . . . *not* load current and/or power supply fluctuations.
- Eliminates time and expense of changing winter-summer heaters. No nuisance tripping, it's fail-safe . . ."

Our Engineering Manager says:

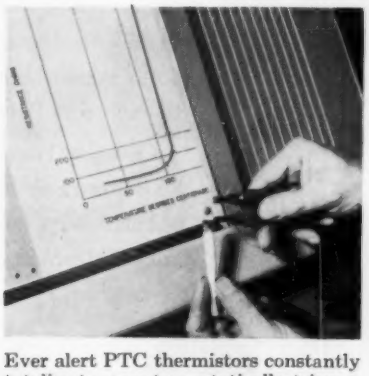
"With the breakthrough development of the Westinghouse Positive Temperature Coefficient thermistors, for the first time we can provide inherent protection against motor failure caused by excessive heat. The solid-state thermistors buried in the windings instantly sense excessive heat from any cause and simultaneously warn of trouble or automatically take the motor off the line. Thus, motor protection is placed where only true motor protection can be . . . in the windings."

Call your Mr. Westinghouse for the application of a Guardistor* motor to your drive requirements . . . write for *Questions and Answers About . . . Guardistor* (B-7876). Westinghouse Electric Corporation, P. O. Box 868, Pittsburgh 30, Pennsylvania.

*Trade-Mark

J-22160

Unlike remotely located sensing devices, PTC thermistors are buried in the windings of the Guardistor motor, instantly equating all temperature factors.



Ever alert PTC thermistors constantly totalize temperature, statically triggering an action *only* if critical temperature is reached.

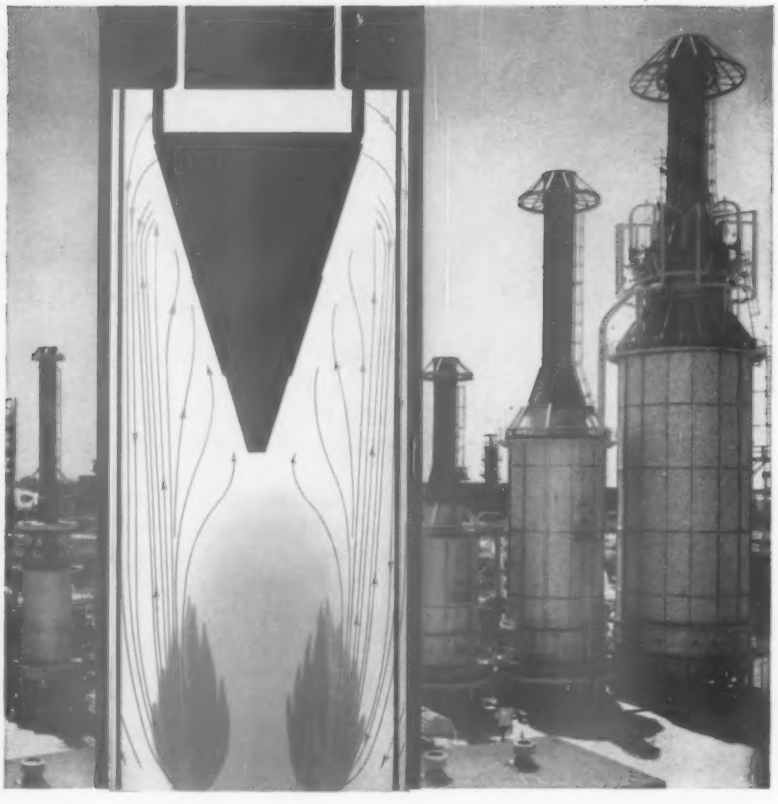
MOTOR & GEARING DEPARTMENT

YOU CAN BE SURE...IF IT'S

Westinghouse

TUNE IN WESTINGHOUSE-CBS TV-RADIO COVERAGE, PRESIDENTIAL CONVENTIONS, JULY 10-29

PUTTING THE HEAT ON EVENLY EFFICIENTLY



Petrochem Isoflow Furnaces give even heat distribution—with added convection sections for maximum fuel efficiency

This is the heart of Petrochem Isoflow Furnaces—the furnaces that get more heat from every measure of fuel. Only Petrochem incorporates all three critical design features so important to highest efficiency in fired heaters: 1) burners specifically designed to furnace needs, 2) properly engineered firebox proportions, and 3) reradiation cones. These factors add up to a more even heat distribution and maximum heat efficiency. Even greater heat efficiency for certain heater applications can be obtained with Petrochem's added convection sections.

Cleaning is easier than with ordinary horizontal-type heaters. Only 25 per cent of the space normally needed is required to pull the tubes of a Petrochem furnace. When specifying furnaces—remember, *there are more Petrochem Isoflow Furnaces in service today than any other make.*

YUBA

specialists in process furnaces for every size, capacity and duty

PETROCHEM DEVELOPMENT DIVISION
6700 Liberty Road, Houston, Texas

YUBA CONSOLIDATED INDUSTRIES, INC.

REPRESENTATIVES: Faville-LeValley Corp., Chicago • Flagg, Brackett & Durgin, Inc., Boston • D. D. Foster Co., Pittsburgh • William H. Mason Co., Tulsa • Lester Oberholtz Assocs., Los Angeles • Rawson-Houlihan Co., Inc., Houston • Rawson Co., Inc., Baton Rouge • Rittelmeyer & Co., Atlanta • H. W. Severance, Prospect, Ky. • Turbex Equipment Co., Narberth, Pa. G. M. Wallace & Co., Denver, El Paso & Salt Lake City • Combustion & Power Equipment Ltd., Montreal & Toronto • International Licensees and Representatives: Birwelco Ltd., Birmingham, England • Fujinagata Shipbuilding Ltd., Osaka, Japan • Heurty Italiana, S.P.A., Milan, Italy • Petrochem, G.M.B.H., Dusseldorf, Germany SETEA S.A., Buenos Aires, Argentina • Societe Anonyme Heurtey, Paris, France • Societe Anonyme Belge Heurtey, Liege, Belgium.

He sells speed to oil men

Here, at the control panel of a Gardner-Denver "2100" drawworks, a Gardner-Denver Petroleum Specialist is introducing a new concept in efficiency: operation so smooth, and with such ample reserves of hoisting and braking power, that it amazes even veteran drillers.

But the Gardner-Denver Specialist is selling more than just a product.

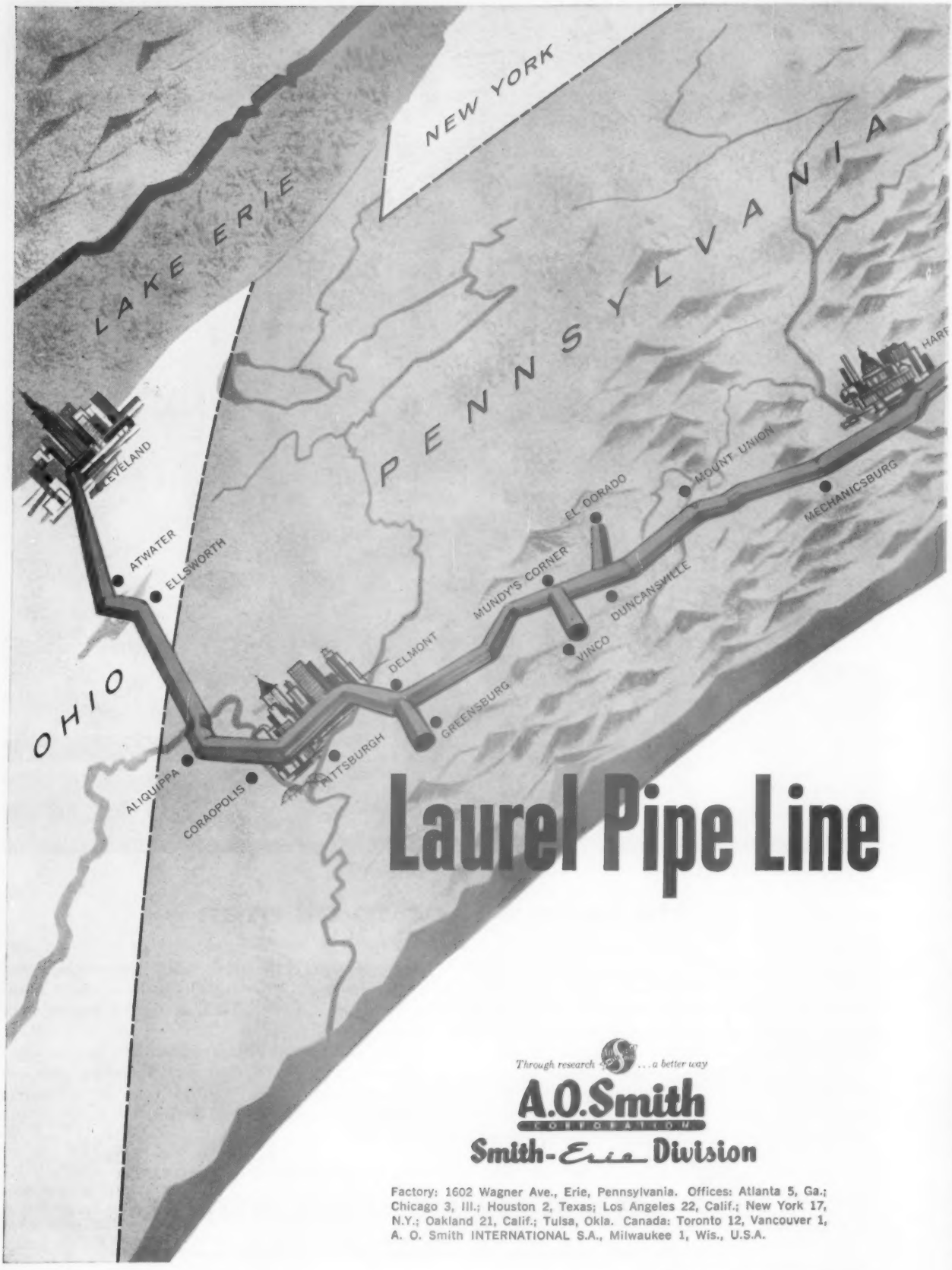
He is selling *speed—drilling speed* that can save days and even weeks of time. The "2100" drawworks is part of a completely co-ordinated Gardner-Denver ultra-modern rig, capable of drilling today's deepest wells at record-making paces.

Gardner-Denver Petroleum Specialists have a single objective: to serve you better, thus assuring your *continuing* satisfaction. That is why so many oil field buyers prefer to deal with Gardner-Denver.

EQUIPMENT TODAY FOR THE CHALLENGE OF TOMORROW

GARDNER - DENVER

Gardner-Denver Company, Quincy, Illinois
In Canada: Gardner-Denver Company (Canada), Ltd., 14 Curity Avenue, Toronto 16, Ontario



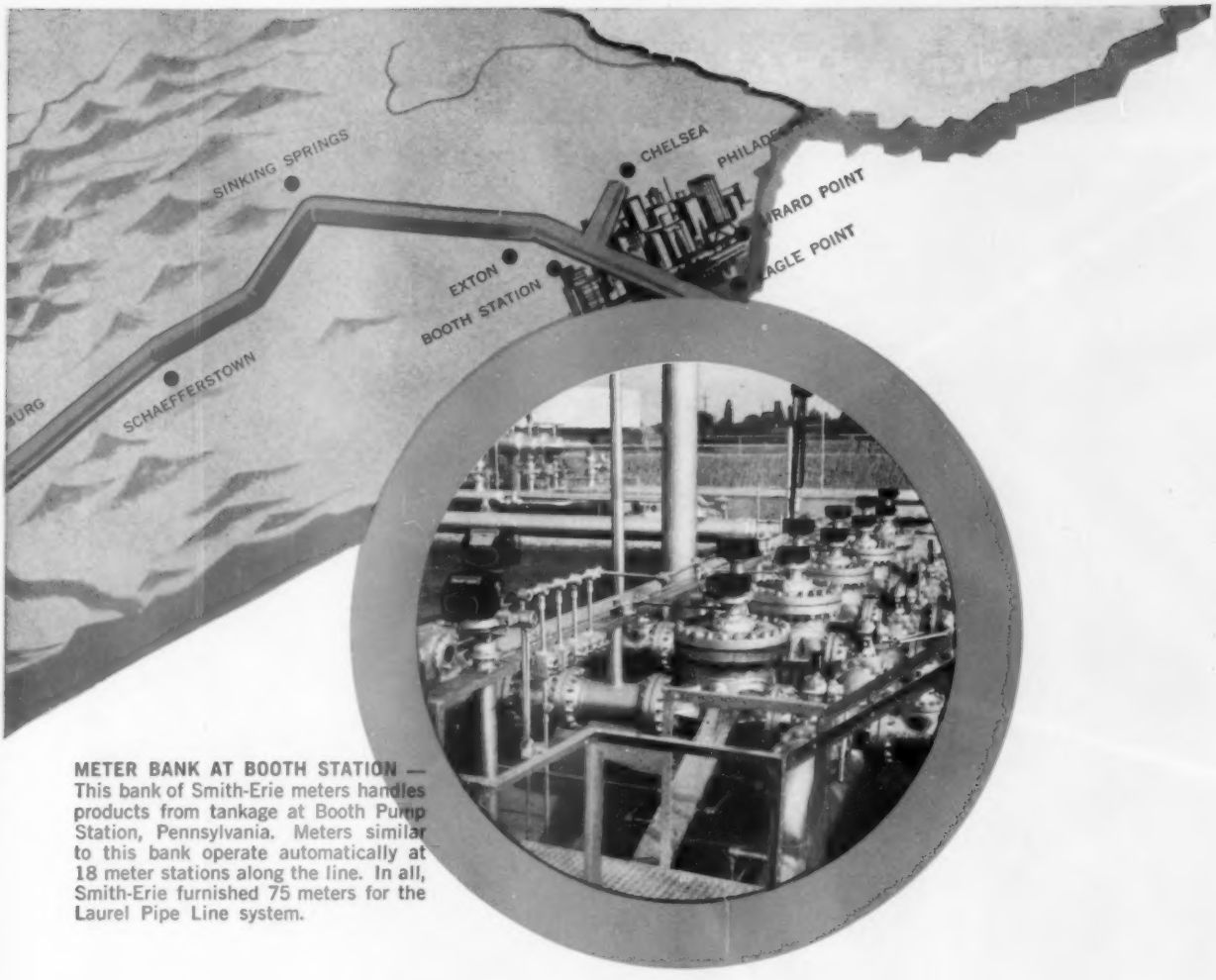
Laurel Pipe Line

Through research ... a better way

A.O.Smith
CORPORATION

Smith-Erie Division

Factory: 1602 Wagner Ave., Erie, Pennsylvania. Offices: Atlanta 5, Ga.; Chicago 3, Ill.; Houston 2, Texas; Los Angeles 22, Calif.; New York 17, N.Y.; Oakland 21, Calif.; Tulsa, Okla. Canada: Toronto 12, Vancouver 1, A. O. Smith INTERNATIONAL S.A., Milwaukee 1, Wis., U.S.A.



METER BANK AT BOOTH STATION — This bank of Smith-Erie meters handles products from tankage at Booth Pump Station, Pennsylvania. Meters similar to this bank operate automatically at 18 meter stations along the line. In all, Smith-Erie furnished 75 meters for the Laurel Pipe Line system.

"autometered" by Smith-Erie

one dispatcher controls flow of 16 grades of products

Flow is automatically controlled all the way from Philadelphia to Cleveland from the Camp Hill office. Sixteen grades of products (everything from burner oil to aviation gasoline) are received into the line from two refineries near Philadelphia, Pennsylvania, and one refinery in New Jersey. Products may be delivered to 18 different metering stations along the Laurel Pipe line.

Smith-Erie "Autometers" are an important part of this highly automatic system. Dispatchers at Camp Hill issue instructions that control both pumpings into the system and deliveries to shippers terminals or other pipeline carriers. For example, the dispatcher, informed that a company is moving 40,000 barrels of kerosene, relays this information to the area deliveryman, then sets this amount on the Smith-Erie set-stop counter and pulls handle. At a predetermined time, dispatcher pushes a button and by remote control opens valve at metering station. Flow continues until the set-stop or the dispatcher terminates the delivery.

Laurel Pipe Line is a working example of how Smith-Erie meters are a valuable asset in automatic operation. For information on how this success can be duplicated for you, contact your A. O. Smith meter man or write direct.

Gulf Oil Corporation, Sinclair Pipe Line Company, and Texaco, Inc., are Laurel Pipe Line Company shareholders.

Naugatuck KRALASTIC®

No waste of time, materials, and money with **KRALASTIC**

There's no need to protect this original ABS pipe from corrosion because KRALASTIC *can't* corrode. There's no need for expensive hoisting and laying equipment because KRALASTIC weighs less than aluminum. Pipe made of KRALASTIC can be loaded, unloaded, carried, and laid by hand. (Consider the safety advantages alone!)

Other advantages? KRALASTIC offers many. Its smooth internal surfaces offer less flow resistance. KRALASTIC pipe can be "welded" with a sleeve fitting and a special solvent. Yet where desired, it can be threaded and made up with standard KRALASTIC valves and fittings. Its unique combination of hardness and extreme toughness protects it against damage from foreign objects in the soil. Yet it can be easily cut to length with a hacksaw.

There are many more advantages to pipe made of KRALASTIC...advantages that have led to and been proved by more than 10,000 miles of pipe installed for everything from potable water to oil, brine, chemical, gas, and electric lines. Discover the advantages of this NSF Approved piping material yourself.

United States Rubber
Naugatuck Chemical Division
DEPT. 716K ELM STREET
NAUGATUCK, CONNECTICUT

KRALASTIC RUBBER-RESINS • **MARVINOL** VINYLS • **VIBRIN** POLYESTERS

Akron · Boston · Chicago · Gastonia · Los Angeles · Memphis · New York · Phila. · CANADA: Naugatuck Chemicals · Elmira, Ont. · Cable: Rubexport, N.Y.

Motors and Generators...that's our Business!

ME* DID!

During the internationally prominent conversion of the PANAMA CANAL from a 25 to 60 cycle operation, 95% of the electric motor awards were made to ME*. This major contract was awarded on the basis of product quality, delivery and company cooperation. For this outstanding project ME* met the full demands of contracting engineers with 800 motors ranging in size from ¼ to 700 H. P. . . . designed to critical specifications — delivered and installed *on time!*

Although this is another feather in the project-studded bonnet of ME* "Injun-eers", our Chief is never satisfied with past won battles, so we'd like to wrestle with your problem during your next project pow-wow. *You'll see too . .* What ME* Can Do . . . *for you!*

This data and specification file on Marathon Electric Motors and Generators is now available for your ready reference use. May we mail you your free copy now?

* Marathon Electric MANUFACTURING CORPORATION

Home Office and Factory at Wausau, Wisconsin

Factories at Erie, Pa., and Earlville, Illinois

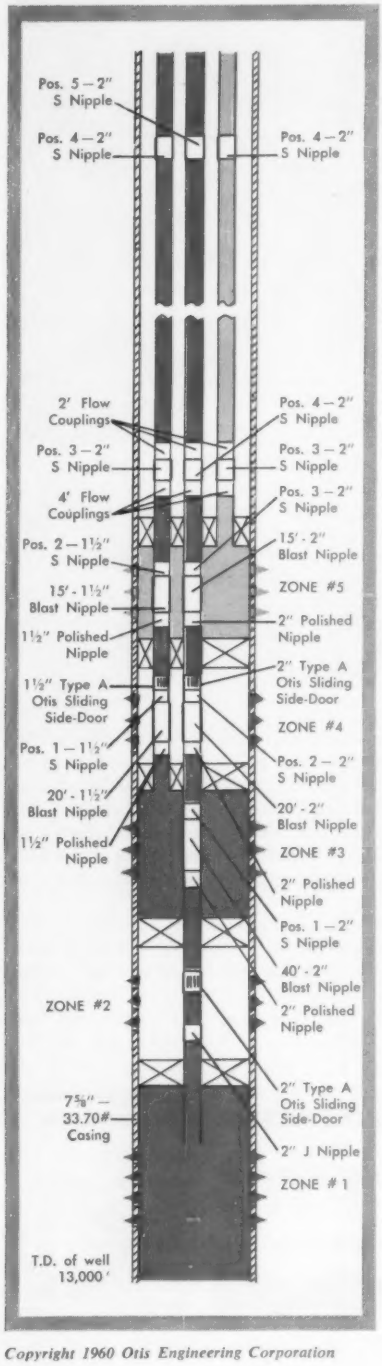
Offices in Principal Cities

MOTORS

SPECIAL REPORT TO MANAGEMENT

OTIS PRODUCTION NEWS

Volume II, Number 1 **Otis Engineering Corporation • Dallas** *Production Equipment and Services*


Pos. 5 – 2" S Nipple
Pos. 4 – 2" S Nipple
Pos. 4 – 2" S Nipple
2' Flow Couplings
Pos. 4 – 2" S Nipple
Pos. 3 – 2" S Nipple
Pos. 3 – 2" S Nipple
4' Flow Couplings
Pos. 3 – 2" S Nipple
Pos. 2 – 1½" S Nipple
15' - 2" Blast Nipple
15' - 1½" Blast Nipple
ZONE #5
1½" Polished Nipple
2" Polished Nipple
1½" Type A Otis Sliding Side-Door
2" Type A Otis Sliding Side-Door
ZONE #4
Pos. 1 – 1½" S Nipple
Pos. 2 – 2" S Nipple
20' - 1½" Blast Nipple
20' - 2" Blast Nipple
1½" Polished Nipple
ZONE #3
2" Polished Nipple
Pos. 1 – 2" S Nipple
40' - 2" Blast Nipple
ZONE #2
2" Polished Nipple
7⅝" – 33.70# Casing
2" Type A Otis Sliding Side-Door
2" J Nipple
ZONE #1
T.D. of well 13,000'

Copyright 1960 Otis Engineering Corporation

Alternate Zone Triple Completion Shows Economic Advantages of Using Otis Equipment and Wire Line Services

LAFAYETTE — This offshore, multiple-zone gas well, located off the coast of Southern Louisiana, illustrates the economic advantages of using Otis sub-surface flow control equipment and wire line services.

The cost of the installation, including the tubing safety valves, sleeves, nipples, and other Otis sub-surface equipment as shown in the accompanying diagram, totaled slightly under $12,000 — or about $65,000 less than what it would cost to move a workover rig onto the well to deepen it and recomplete the lower zones, had the well been drilled and completed differently. As equipped, this well can be produced until all five zones have been depleted, with only occasional wire line service to permit production from each of the different zones.

T.D. of the well was approximately 13,000 feet with five different zones of potential production below 12,600 feet. When called to engineer the completion, Otis specialists were asked to design an installation that would permit alternate production of three of the zones through the long string and one through each of the other strings, or two zones through the long string and two through the intermediate string, with the top zone to be produced through the short string.

Two single packers were used to isolate zones 1 and 2 and a Type A Otis Sliding Side-Door and Type J Otis Landing Nipple were made up in the tubing between the two packers. This arrangement will permit the bottom zone to be produced first through the long string, and then zone 2 by setting a Type PJ Otis Plug Choke in the landing nipple and shifting the sleeve in the Sliding Side-Door®. The Type PJ choke is designed to hold pressure from either direction.

A blast nipple with a Position 1 Type S Otis Landing Nipple above and a polished nipple below was designed into the long string opposite zone 3. This is the zone to be produced through the intermediate string. In the event flow from zone 3 should cut through the blast nipple, the landing nipple and polished nipple will be used to pack off the hole and permit continued production of either of the lower zones through the long string. The landing nipple above the blast nipple may also be used to land a plug choke in the event both lower zones deplete sooner than anticipated and the operator decides to produce zone 4 through the long string.

Otis sliding side-doors were designed into both the intermediate string and the long string between the packers isolating zone 4. This will permit selective production of that zone through either string of tubing. S nipples, blast nipples, and polished nipples were also made up on both the intermediate and long strings opposite zone 4 to provide the tubing with the same protection as described for zone 3.

In that this was a gas well, S nipples with flow couplings above and below were made up in all three strings of tubing, immediately above the top packer, to accommodate Type FS Otis Tubing Safety Valves. This provided Storm Choke® protection for each string. By locating the safety valves just above the top packer, the operator will be able to carry on a corrosion inhibitor program without pulling the safety valves. S nipples were also located in each string approximately 1,500 feet from the surface for plugging purposes until gathering lines could be laid.

This Otis-engineered completion was designed to provide the ultimate in economical, versatile, and efficient alternate-zone production. For more information on alternate-zone, multiple completions or for help with any other specific completion problem, call the Otis office nearest you or write Otis, Dept. 1-W, Box 35206, Dallas 35, Tex. Experienced Otis specialists are ready and anxious to provide you with a "packaged" well completion service.

OTIS

Engineering Corporation

General Offices:

6612 Denton Drive • Dallas, Texas

Planning a tank battery hookup soon?

Get your choice of connections at National Supply

Complete choice of tank battery hookup components is yours at the nearby National Supply store. The typical store shelves illustrated above show the ready availability of Victaulic grooved fittings and Larkin swage nipples and bull plugs. Equally available are other famous products for tank battery hookups—Rockwell valves, Weco unions, Tube Turns welded connections and Stockham fittings, to name a few.

Similar choice ranges are available for *all* your oil country supply needs. National Supply purchases equipment and supplies from literally thousands of different sources, every one a leader in its field. Next time you buy supplies, take advantage of this complete variety by calling National Supply.

See next pages for Sucker Rod Information

Now! National Supply offers Sucker Rod

National Supply now has a complete line of six rod grades to meet every well condition from non-corrosive to highly corrosive salt water and sulphide. Recommended application for each of the six grades is shown in the selection chart below.

A new high strength Grade 45 sucker rod rounds out this National Supply line. It is recommended for wells where there is little or no corrosion and where heavy loads are encountered.

One big reason for buying National Supply rods is the advanced way they are packed and handled to make sure they reach you in factory perfect condition, ready to be run in the well.

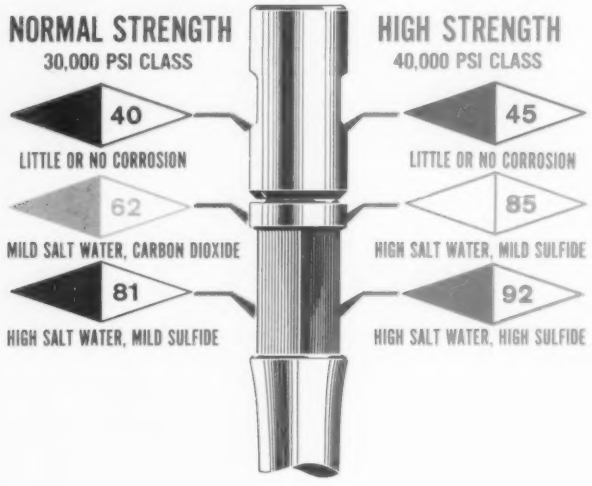
First step in packing National Supply rods is to place each one in a separate groove on the pallet. Each package is firmly secured with five steel straps to prevent movement. Anti-slip brackets prevent lateral slippage of packages.

All lifting, both at plant and by customer, is facilitated by use of special lifting rods and cables that are shipped in place. After sucker rods are carefully loaded on the flat car, they are fully secured by heavily braced bulkheads to guard against shifting in transit.

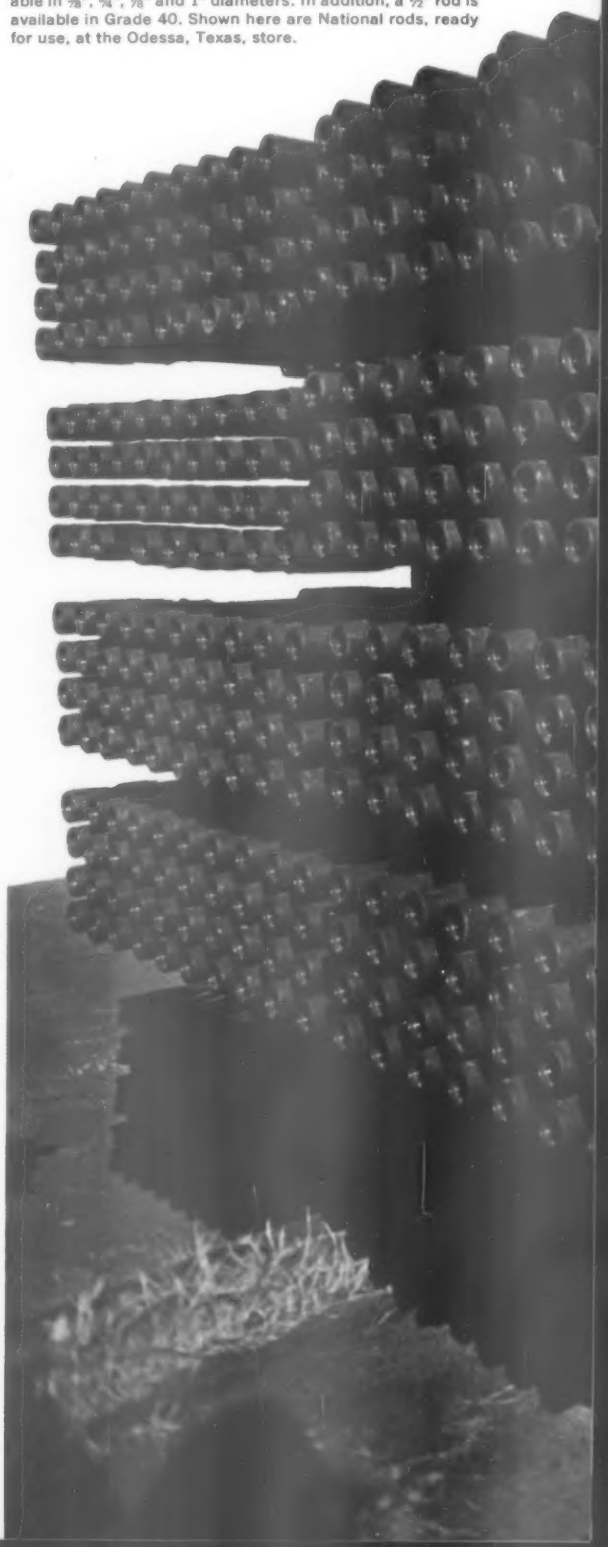
This careful packing and shipping control typifies the utmost quality control that National Supply exercises throughout the manufacturing process. End result is the ultimate in uniformity, dependability and economy.

Now is the best time to review your sucker rod needs with your National Supply representative. It'll pay to call him today.

Sucker Rod Selection Chart



National Supply sucker rods always reach you in factory perfect condition. All National Supply rods are readily available in ⅝", ¾", ⅞" and 1" diameters. In addition, a ½" rod is available in Grade 40. Shown here are National rods, ready for use, at the Odessa, Texas, store.



grades to meet every well condition

Steel

Steel's Symbol of
strength, long life,
and economy

Complete downwell pump servicing facilities are available through your National Supply stores.

Need fast service on a downwell pump?

Fast, economical maintenance is a reality when you consistently use National Supply's downwell pump service.

All repairs are handled promptly by qualified personnel in well equipped, strategically located pump service shops.

National Supply pump shops have large stocks of repair parts and are ready to serve your needs without delay.

If you need new pumps, your nearby store has complete stocks of famous Oilmaster pumps and can fill your order immediately. Quality-wise, Oilmaster pumps are definitely superior. They are manufactured under stringent quality controls by the Fluid Packed Pump Company, a division of National Supply. Thus, pump servicing and new pump recommendations are backed up by the know-how and skills of the original manufacturer.

You'll find it pays to call National Supply next time you need new pumps, or service work on your present pumps.

THE NATIONAL SUPPLY COMPANY

Two Gateway Center, Pittsburgh 22, Pennsylvania

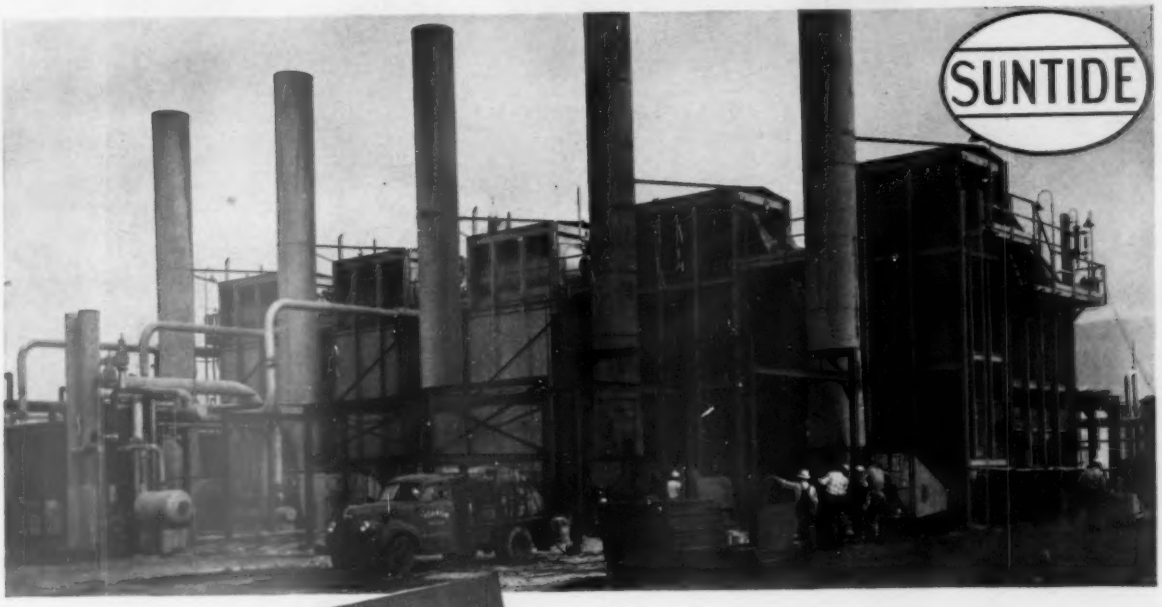
Subsidiary of Armco Steel Corporation

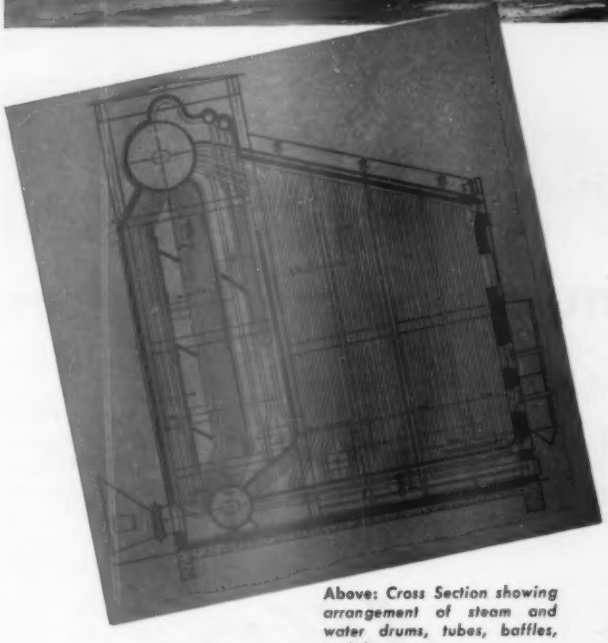
DIVISION OFFICES: Calgary, Columbus, Dallas, Denver, Houston, Torrance, Tulsa

EXPORT: 600 Fifth Avenue, New York 20, N.Y., U.S.A.; City Wall House, Chiswell Street, London E.C. 1

Vogt STEAM GENERATORS

at SUNTIDE REFINING COMPANY
Viola, Texas





Above: Cross Section showing arrangement of steam and water drums, tubes, baffles, and furnace.

6 EFFICIENT AND ECONOMICAL UNITS SERVE THIS MODERN REFINERY

Principle Data Each Unit

- 85,000 pounds steam per hour capacity, designed for 500 lbs. S.W.P. and 625° F. total temperature.
- Water cooled furnace.
- Burners for Gas and Oil fuel.

Vogt offers a complete line of custom built and package type steam generators. Available in bent tube and straight tube designs for solid, liquid, or gaseous fuels burned singly or in combination.

Write for bulletins. Dept. 24A-BO

OTHER VOGT PRODUCTS

Forged Steel Valves, Fittings and Flanges—Petroleum Refinery and Chemical Plant Equipment
Heat Exchangers
Ice Making and Refrigerating Equipment

HENRY VOGT MACHINE CO.

Box 1918, Louisville 1, Kentucky

SALES OFFICES: New York, Chicago, Cleveland, Dallas, Camden, N. J. St. Louis, Charleston, W. Va., Cincinnati, Los Angeles.

UNINTERRUPTED POWER

SMOOTHER THAN STEAM

STEPS UP SPEED OF FRACTURING OPERATIONS BY 20%

Take it from Equipment Manager Tyra Lewis of Producers Chemical Company: "You have to have the kind of unhesitating power – with those full-power shifts – you get from TORQMATIC DRIVE to do a really good job of fracturing."

That's the big reason this Borger, Texas, company replaced stick shifts with TORQMATIC in all 7 of their units working the Borger-Pampa-Perryton area.

Ever since these TORQMATIC replacements were installed, these units have been doing a smoother, easier-to-control job. Operations have been 20% faster. Yet operators now require virtually no job-training–another big saving to Producers Chemical.

And that isn't all. With "smoother than steam" TORQMATIC DRIVES, all 7 units log far less down-time. That in itself is a big plus to any fracturing operation. But maintenance costs have also been cut – by a full 25%. It's easy to see why Producers Chemical is planning to TORQMATIC equip still another unit soon.

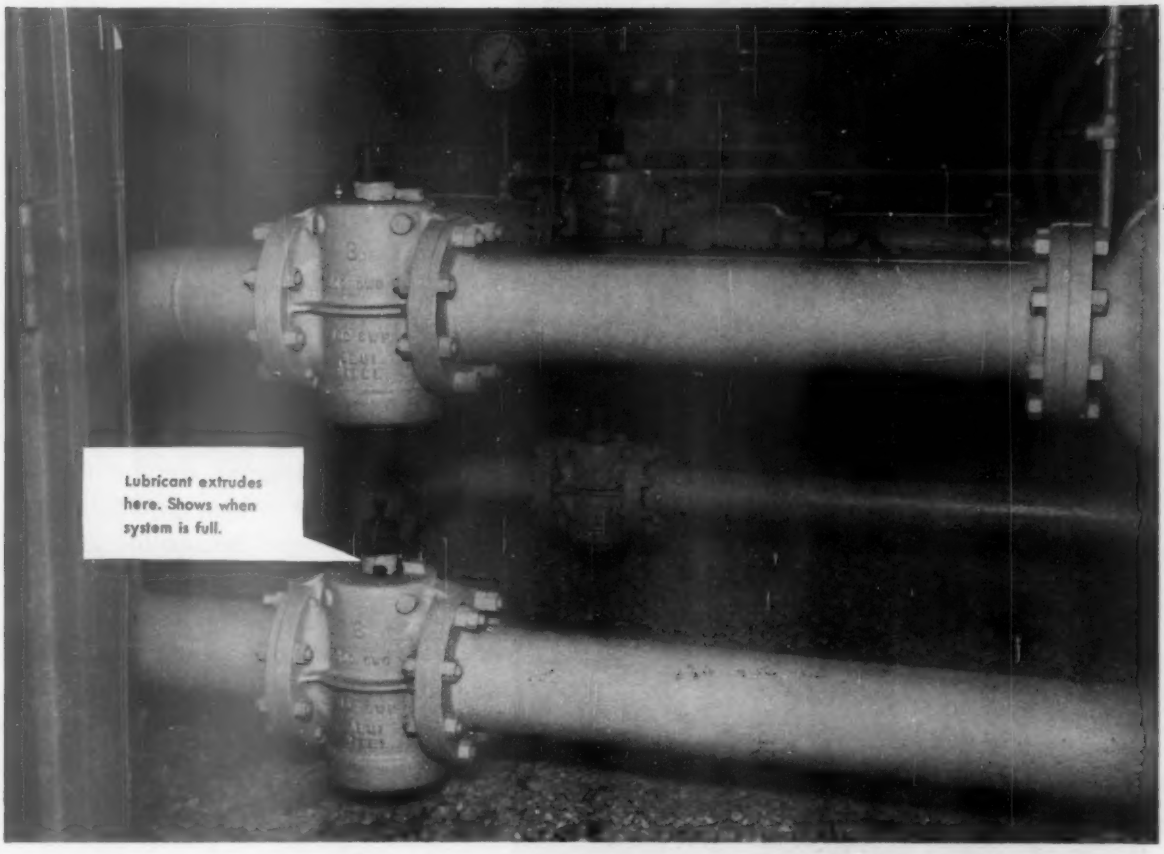
Like to cash in on big time- and money-savings like these in your drilling, servicing or fracturing operations? All it takes is equipment with Allison TORQMATIC DRIVE –installed by leading oil field equipment manufacturers. See your dealer or write Allison Division of General Motors, Indianapolis 6, Indiana. In Canada: General Motors Diesel Limited, London, Ontario.

Allison

TORQMATIC® DRIVES

THE MODERN DRIVE FOR MODERN EQUIPMENT

YOU GET DEPENDABLE VALVE SERVICE from HOMESTEAD® Lubricated Plug Valves. Their controlled high-pressure lubricant system (plus very close tolerance between plug and body) guarantee



positive shut-off without extrusion of lubricant into the line where it might clog orifices, meters or low-pressure lines. Instant operation is assured, too, because sticking is prevented by piston-like movement of the plug during lubrication. And to make sure that all the benefits are in *every* Homestead Lubricated Plug Valve, *each one is tested before and after lubrication.* For full information, send coupon.

hv

HOMESTEAD VALVE MANUFACTURING COMPANY
P.O. Box 406, Coraopolis, Pennsylvania

406

Gentlemen: Please send me Catalog 39-1 and prices on Homestead Lubricated Plug Valves

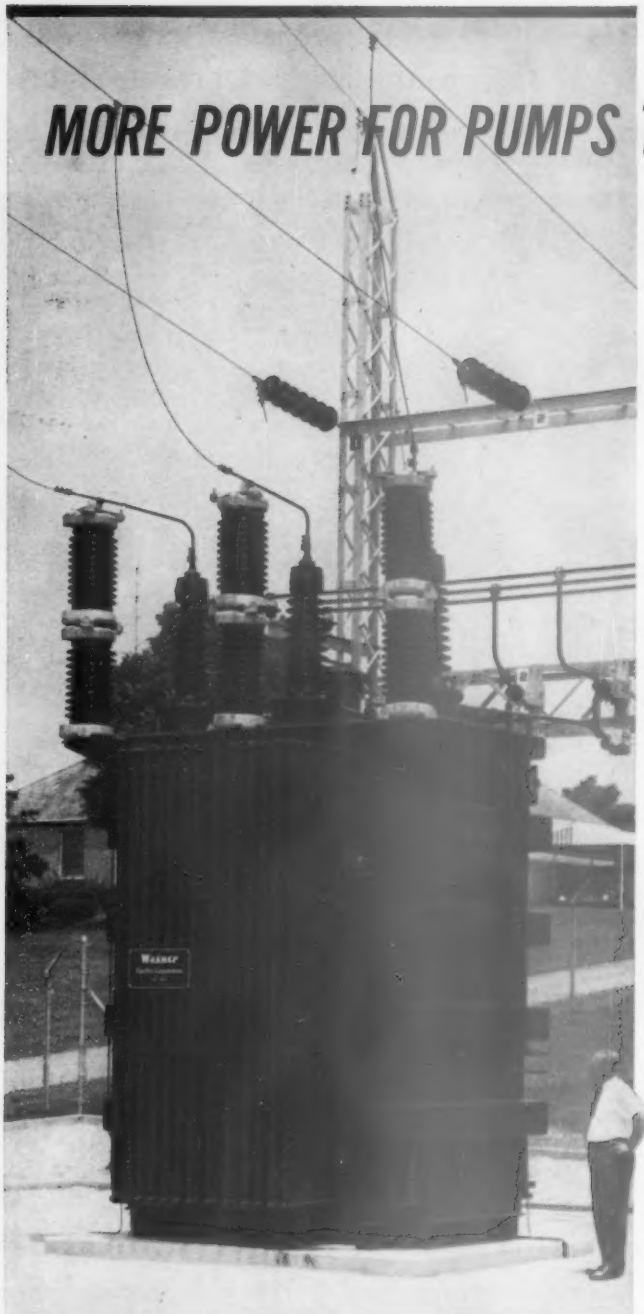
Name..... Title.....

Company.....

Address.....

City..... Zone..... State.....

MORE POWER FOR PUMPS THAT PUSH PETROLEUM



THIS WAGNER TRANSFORMER

POWERS-UP

PLANTATION PIPELINE

The Plantation Pipeline Company pumping station at Neese, Georgia, is part of an underground transportation system that pushes high quantities of petroleum products to their market.

The Neese operation was originally served with power from a 44 kv system substation. However, the size of the pumping load—which includes some 1800 hp motors—became too great for the substation to handle adequately.

To better serve the load, Georgia Power Company recently installed a 110 kv line and built a new substation. Wagner Electric Corporation furnished the transformer rated at 7500 Kva for this purpose. Today, Plantation Pipeline pumps with full power.

Now, what about your power needs? If they present a critical (or even a potential problem), call your nearby Wagner Sales Engineer. He'll help you plan your power program . . . suggest Wagner transformers that will meet your needs for years to come. There are Wagner branches in 32 principal cities.

Wagner Electric Corporation

6389 PLYMOUTH AVENUE,
ST. LOUIS 33, MISSOURI

WT60-8

SERVING 2 GREAT GROWTH INDUSTRIES—*ELECTRICAL • AUTOMOTIVE*

HOKE Flow Sheet 2

HOKE REPORTS ON FLUID CONTROL

WE'VE PACKED PERFORMANCE IN A PACKLESS VALVE

How to be "Flip" About On-Off Control

We've turned the tables on electrical engineering profs who try to demonstrate current flow by describing a valve on a pipe. Our switch-action toggle valves stop and start flow just as easy as: Flip, it's on! – Flip, it's off!

These valves perform a basically simple function, but a lot of engineering went into them to insure perfect performance. Many are used on precision test equipment and for control applications, often in conjunction with automatic controls as a manual safeguard for fast shut-off. Designed for both

gas and liquid service, the stem seals are tight enough for most vacuum work, too. We certainly can't be flip about these specifications.

Hoke manufactures two types of toggle valves. The 450 Series has maximum operating pressures up to 200 psi. These are spring closing valves made in ¼" and ⅛" pipe sizes which can be classified as "miniatures", measuring less than 2" in height in the closed position. They are normally supplied with moulded, black, Nylon handles, but colored handles can be supplied for special identification purposes. Panel mounting lock-nuts are included as standard equipment on every valve.

The second type is the 490 Series, a cam-closing toggle valve for service up to 2000 psi. They'll give you the same quick, positive action as the 450 Series, while performing the toughest laboratory and process jobs. The 490 and the 450 are excellent performers on non-critical high vacuum. They can be helium leak-tested for this purpose.

So, if you're interested in switch-action flow control, investigate the Hoke toggle valves. We'll be happy to equip you with complete technical data. A check in the coupon to the right will bring you the facts.

The development of packless valves has so greatly reduced the problems of handling high pressures, temperatures and vacuums, and dangerous fluids that engineers designing such systems can now spend more time curled up with the Hoke Corrosion Chart.*

With this extra time, many have dreamed up weird applications for the Hoke 440 Series bellows seal valve, trying to snare us in our own semantics. In a rash moment, we boasted that this valve could be modified for almost any application. Actually, the 440 can be modified to work at high pressures (up to 2000 psi), for high temperatures (up to 1000°F.), and for special connections such as tubing, socket welding, and silver brazing.

Aside from this horn-blowing, here are the dry facts. The basic design includes a stainless steel body, inert arc-welded bellows assembly, Teflon gaskets and Teflon stem point discs. This is only the starting point. Minor modifications make so many models available that almost any problem, including liquid metal handling, can be solved.

Hear what a disbeliever said: "I did not believe that the modified valves would satisfy all my requirements, especially to keep a high vacuum of the order of 10^{-9} mmHg under a wide variation of temperatures; however, I now acknowledge that the modified Hoke 440 valves fulfilled their duty perfectly." This came from The Martin Company, where we sent 440's for use in cesium vapor up to 400°F. Special

The cesium boiler shown above uses a modified version of the Hoke 440 series bellows seal valve (at right) to handle high vacuum of 10^{-9} mmHg and cesium vapor at temperatures up to 400° F.

modifications made these valves readily usable on a cesium boiler and converted an infidel to the true valve.

If you work with critical high vacuum, high pressures, high temperatures and dangerous fluids, proceed with care. Ask for our Packless Valve Bulletin to reap a harvest of engineering plums.

** Makes good reading if you're handling corrosive agents. Write, and we'll send you one.*

FREE! A STEADY FLOW OF FACTS!

Further flow features, and interesting technical topics are carefully covered in Hoke's technical publication, the FLOW SHEET. It's free, but worth millions! To get the full benefit of our engineering and editorial efforts six times a year, mark your "X" in the proper box.

Hoke's Performance Guarantee — *Every Valve Leak-Tested!*

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- ☐ FREE Corrosion Slide Rule
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Some Straight Talk On Steam Trap Capacity

...or pulling away the curtain of confusion that surrounds steam trap capacity ratings.

Unfortunately, for the steam trap buyer, the subject of steam trap capacity has become cloudy and confused by a landslide of claims, counterclaims and inconsistent "standards" for measurement. So let's take a cold hard look at this subject so vital to the efficient operation of your plant.

What Determines Steam Trap Capacity?

There are three factors that determine the capacity of a steam trap:

1. The area of the orifice.
2. The density of the condensate.
3. The pressure differential across the trap.

Let's take a closer look at each of these:

Area of orifice is usually specified by the trap manufacturer or can be calculated from the diameter. Nothing complicated here.

Density of condensate depends on temperature. A cubic foot of cold water weighs 62.4 lbs. At 250° F. or 15 psi, it weighs less than 59 lbs. This is important. Don't overlook it.

Pressure differential across the trap is most significant. And it is complicated by the many factors that affect it, such as:

1. Pressure drop between unit drained and the trap when the trap valve is open.
2. Distance the trap valve is moved from the valve seat.
3. Back pressure on the trap with orifice closed; i.e., return header pressure.
4. Increase in back pressure produced by condensate and flash steam flowing in the discharge line. This in turn is affected by the diameter and length of the discharge line, plus friction caused by valves and fittings.

Orifice Capacity Vs. Steam Trap Capacity

Figure 1 shows a ½" diameter sharp-edged orifice at the end of a pipe filled with cold water at 15 lbs. pressure. The capacity of this orifice, using a .61 coefficient of flow would be 8,800 lbs. per hr. Now, would this ½" orifice if used in a ¾" steam trap installed as shown in Figure 2 provide the trap with a continuous discharge capacity of 8,800 lbs. of hot condensate per hour? The answer is "no". And here are some of the reasons why:

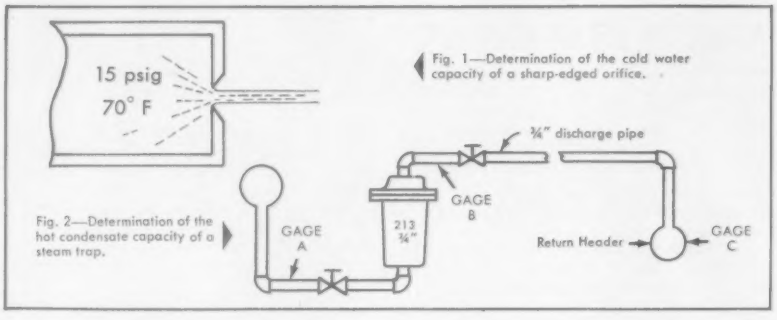


Fig. 1—Determination of the cold water capacity of a sharp-edged orifice.

Fig. 2—Determination of the hot condensate capacity of a steam trap.

Density of condensate. As pointed out above, cold water weighs 62.4 lbs. per cu. ft. At 15 lbs. pressure and 250° F. water weighs less than 59 lbs. per cu. ft. This difference in density alone reduces the lbs. per hour capacity of the orifice by over 5%.

Pressure differential across the trap. With the trap valve closed we have a static pressure differential of 15 psi. The trap valve must be able to open against this pressure. However, this is not the pressure differential that will determine the capacity of the trap valve.

The ¾" discharge line will be full of a mixture of flash steam and condensate. To keep this mixture flowing from the trap outlet to the return line requires a pressure differential. In actual capacity tests run as shown in Figure 2 Gage B at the trap outlet registered 11 lbs. back pressure. Thus the true pressure differential across the trap was about 4 lbs. Under these conditions the measured capacity of the trap was 4,340 lbs/hr. or just about half of the capacity of the ½" orifice for cold water.

How Armstrong Determines Capacity Ratings

Armstrong trap capacity ratings are based on hundreds of tests under actual operating conditions. In these tests, the condensate used was at the steam temperature corresponding to the test pressure. Thus, the capacities determined take into account the pressure drop that occurs when the trap orifice opens and the choking effect and back pressure of the flash steam. Actual installation hookups were used so that pipe friction in both inlet and discharge lines as well was reflected in the results.

Let's go back to the example cited above and in Figure 2. The trap referred to is an Armstrong No. 213. While it did test out at 4,340 lbs. per hour for a static pressure differential of 15 psi, it is rated in the catalog at only 3900 lbs. per hour for this pressure—just to be on the safe side.

For the trap buyer, this means that Armstrong Steam Trap capacities are based on handling condensate at steam temperature for the stated static steam pressure differential under actual working conditions.

Capacity ratings which don't take into account all of the variables will be misleading and may lead to the selection of undersized traps. So whenever you specify or buy traps be sure that the capacity ratings you work from are realistic. One way to be sure is to select Armstrong Traps with *guaranteed* capacity ratings.

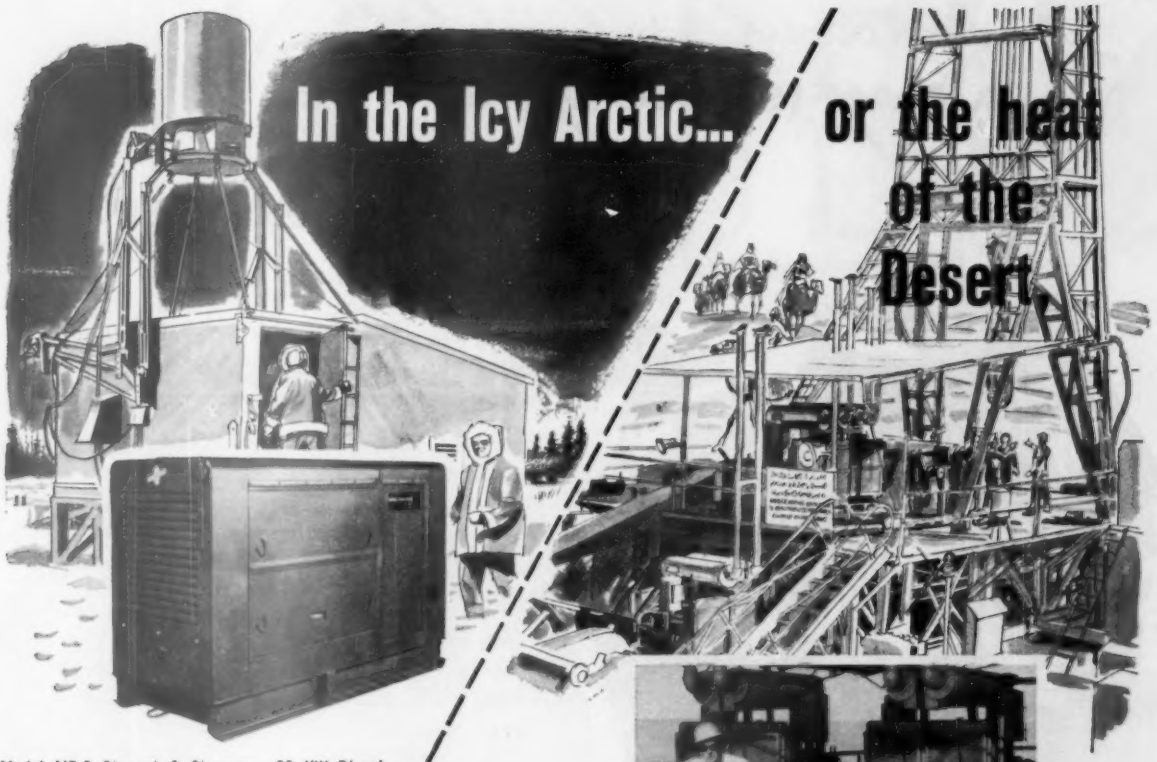
* * *

Additional information on trap capacity ratings, plus data on how to correctly size, install and maintain steam traps for any pressure, any temperature and any load, are presented in the 48-page Armstrong Steam Trap Book. Ask your local Armstrong Representative for a copy or write:

Armstrong Machine Works
8684 Maple Street
Three Rivers, Michigan

ARMSTRONG STEAM TRAPS

"See our catalog in Refinery Catalog"



Model MB-2 Stewart & Stevenson 30 KW Diesel Generator Set generating power around the clock. The unit provides electric power for operation of electronic apparatus vital to human safety and communications in the Arctic.

Parker Drilling Company rig, powered with GM Model 12103 Diesel Engines. Lighting and auxiliary power are supplied by a Stewart & Stevenson oilfield Utility Unit and Rig Lighting Plant. The engines were properly equipped and modified by Stewart & Stevenson with special cooling and air intake systems.

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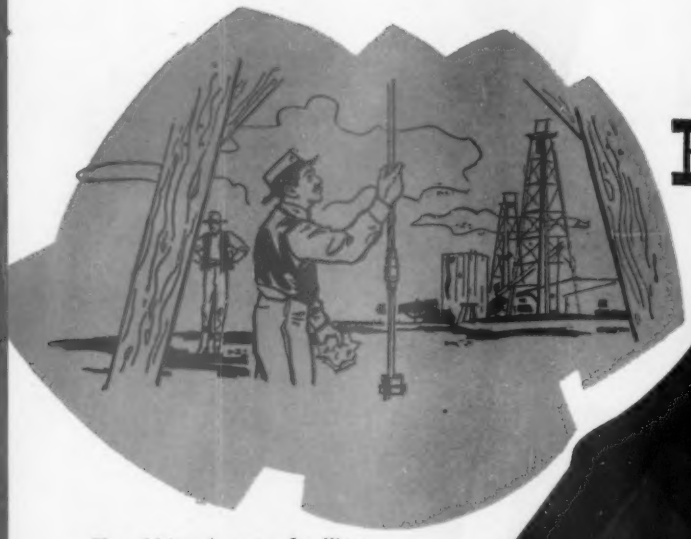
FIRST IN 1894...



The oldtimer's way of telling how a well was pumping was by feeling the polished rods. Long ago Jones developed more scientific methods to learn about the mechanics of pumping with sucker rods.

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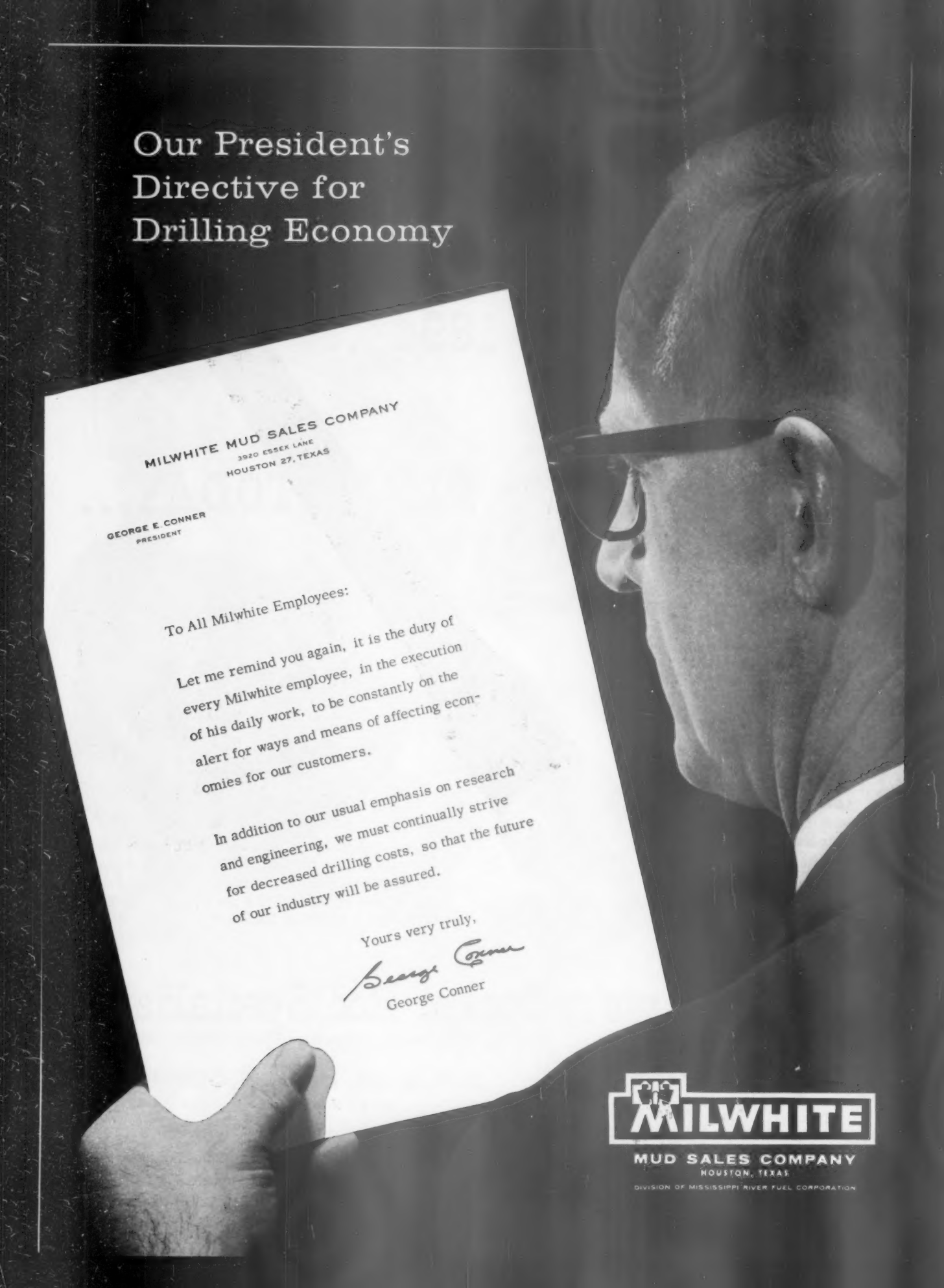
Our President's Directive for Drilling Economy



MILWHITE MUD SALES COMPANY
3920 ESSEX LANE
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GEORGE E. CONNER
PRESIDENT

To All Milwhite Employees:

Let me remind you again, it is the duty of every Milwhite employee, in the execution of his daily work, to be constantly on the alert for ways and means of affecting economies for our customers.

In addition to our usual emphasis on research and engineering, we must continually strive for decreased drilling costs, so that the future of our industry will be assured.

Yours very truly,

George Conner

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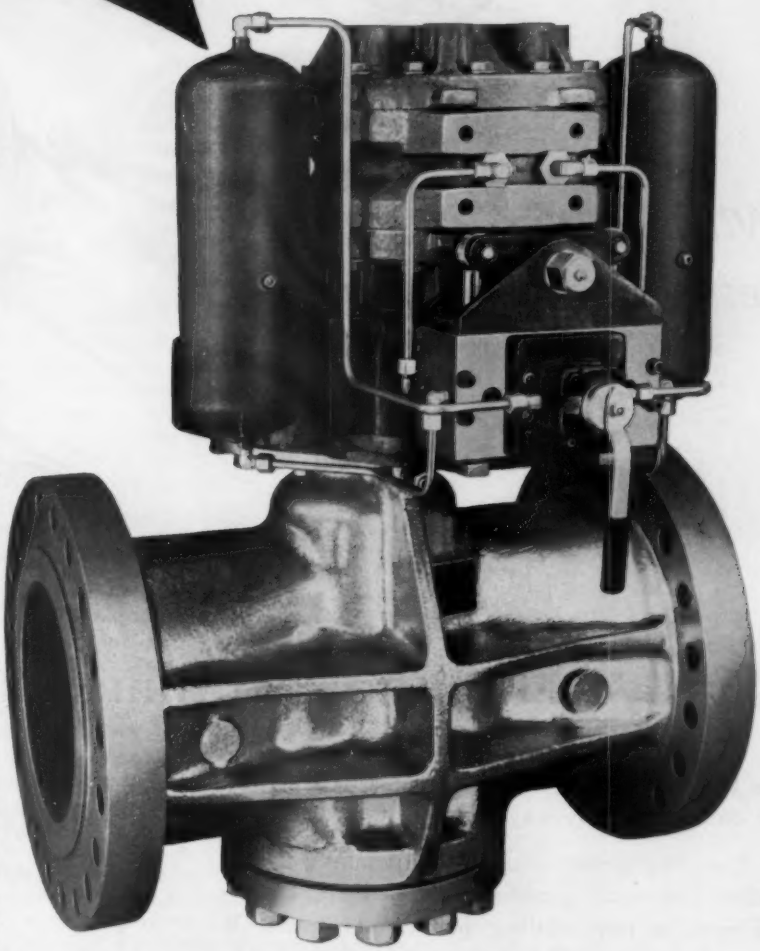
LimiTorque INTRODUCES.... the new type "G" series GAS-HYDRAULIC OPERATORS for plug valves of any size

SIMPLE • RELIABLE • ECONOMICAL • FAST • SMOOTH OPERATION • DELIVERS TORQUE "WITHOUT SHOCK," THROUGH ONLY ONE MOVING PART



These operators have oscillating vane type Hydraulic motors, applying power directly to the plug valve stem—they can be mounted in any position, and are designed to eliminate the usual gearing found on plug valves.

The new LimiTorque type "G" operators are designed primarily for utilization of gas pressure from the pipe line on which they are installed; however, they can be operated by air or liquids from other pressure sources —with or without accumulators.

For pressure operation, the units are equipped with a shear-seal type directional control valve having three positions: Valve open, valve closed, and neutral. For manual operation, the units operate through a specially designed hand pump mounted on the side of the vane motor. The type "G" units can be easily mounted on the plug valve, and because they are directly centered over the shaft . . . It is not necessary to remove the valve from service in order to install the type "G" unit. No maintenance is required with these operators, and it is not necessary to check the level of oil in the accumulation tanks, as this is taken care of automatically.

For complete information, contact your valve manufacturer, or your nearest LimiTorque Sales Engineering Office.

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Which is the left-handed grip?

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In hitting a ball or drilling a well, the right way is usually the easy way.

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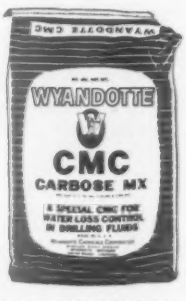
Wyandotte offers a number of drilling mud additives, as well as materials for gas dehumidification, demulsifying, emulsifying, secondary recovery, water treatment, cementing, sweetening, and many other petroleum, refinery, and petrochemical applications. Get full details from your distributor, or write: *Wyandotte Chemicals Corporation, Wyandotte, Michigan. Also Baton Rouge, Louisiana. Offices in principal cities.*

ANSWER: Left hand on top, left-handed grip. Shown on the right, of course.

* * * * *



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RAYKAY 1

Code name for a Raymond joint venture, Raykay 1 is the unique deep-water oil loading depot now being built 28 miles offshore in the Persian Gulf. It is scheduled for completion about March 1961, and is designed to speed Iraq's oil exports by eliminating congestion at the port.

A $15,000,000 project

This great terminal literally took off eight months ago, when it floated out from England behind a towline that would eventually carry it 7,000 miles to its final berth.

Twelve hundred feet long and complete with heliport and air conditioned crew quarters, Raykay 1 will be linked to Fao, its source of supply, by two 32-inch submarine pipelines. Two 65,000-ton tankers at a time will be able to load without having to navigate the shallow waters of the river leading to the present port. And the creative engineering of Raymond International is helping to make this possible.

Whatever your offshore problems, no matter how deep or distant, take advantage of Raymond's experience in many seas, in many parts of the world. We have the knowledge and the equipment, and we'd like to help. Write or call any of Raymond's offices throughout the world.

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View from an oilman's club in Houston of the Gulf Building, home of The National Bank of Commerce.

See It to Believe It

A healthy skepticism is a good thing, whether it is concerned with a friend's version of his fishing trip or whether a salesman is trying to take you to the top of the mountain.

But, whatever skepticism you may have about the future of Houston as an important oil center will vanish when you see what's going on here. The domestic operations for many major oil companies—Texaco, Humble and the Jersey group, Gulf, and Continental—are being domiciled in Houston. Others—such as Shell, Mobil, Pure, and Tidewater—maintain large offices. And more and more oil companies are finding it to their advantage to maintain a listening post here.

To keep in the center of domestic oil activity you, too, should consider an office in Houston. That's where we come in. As the principal bank for many of the largest companies in this area, The National Bank of Commerce of Houston is in a position to help you with contacts, advice, and, of course, all banking services.

The Oil and Gas department is qualified to help you in all fields of activity. Working closely with other bank departments—Loan, Trust, International Banking, Investment—you will find the same sort of service waiting for you that has made this *the* bank of Houston oil men.

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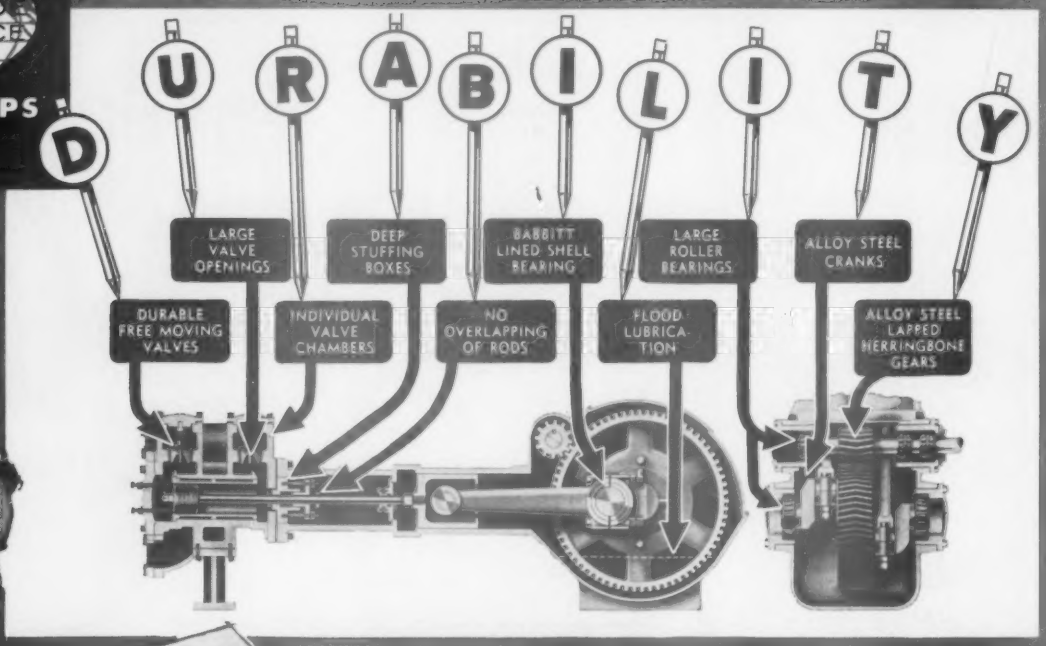
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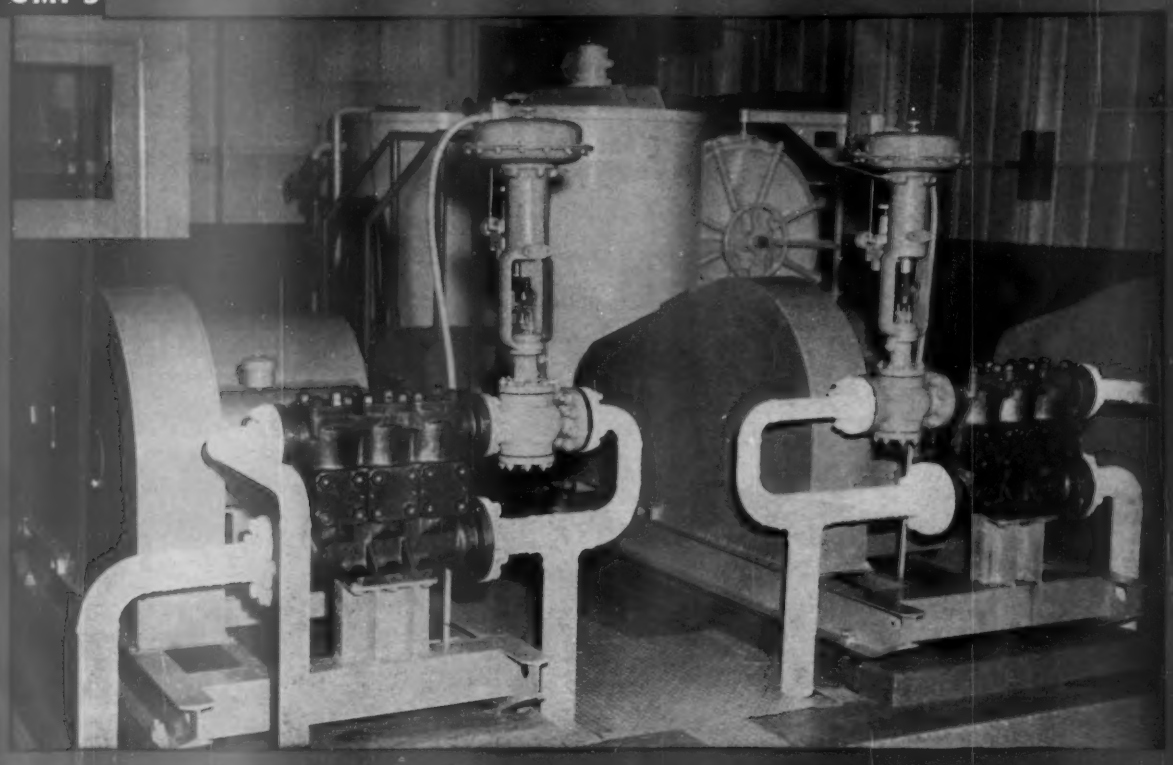
GASO PUMPS

WHAT'S BACK OF GASO LEADERSHIP IN WATER FLOODING?



There's a Single-Word Answer: PERFORMANCE

The photograph shows one of a steadily mounting number of Gaso installations in water flooding service.

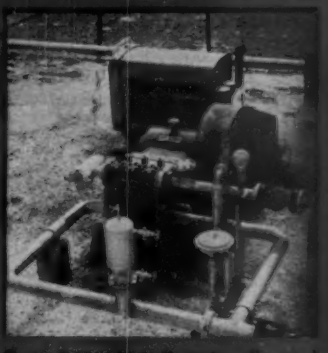
The injection pumps (3) are Fig. 3365, 1¾" x 3" Gaso Horizontal Triplex Plunger Pumps, driven by 40 HP 1200 RPM electric motors.

The fluid ends are of aluminum bronze fitted with ceramic plungers, non-adjustable type plunger packing (in both power and fluid ends) and Bakelite insert type valves mounted on Monel valve seats.

Each of the three pumps, operating at 350 RPM, delivers approximately 1075 barrels a day at 1500 pounds discharge pressure.

Complete adaptability to the job plus GASO design throughout is a time-tested guarantee of thoroughly dependable service extending far beyond the normal life expectancy of pumping equipment.

In the GASO line you will find the effective answer to any pumping problem associated with water flooding. Write for our 1960-61 catalog, or get in touch with our nearest distributor.



Gaso Pump for salt water disposal service in Louisiana

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and still no overhaul

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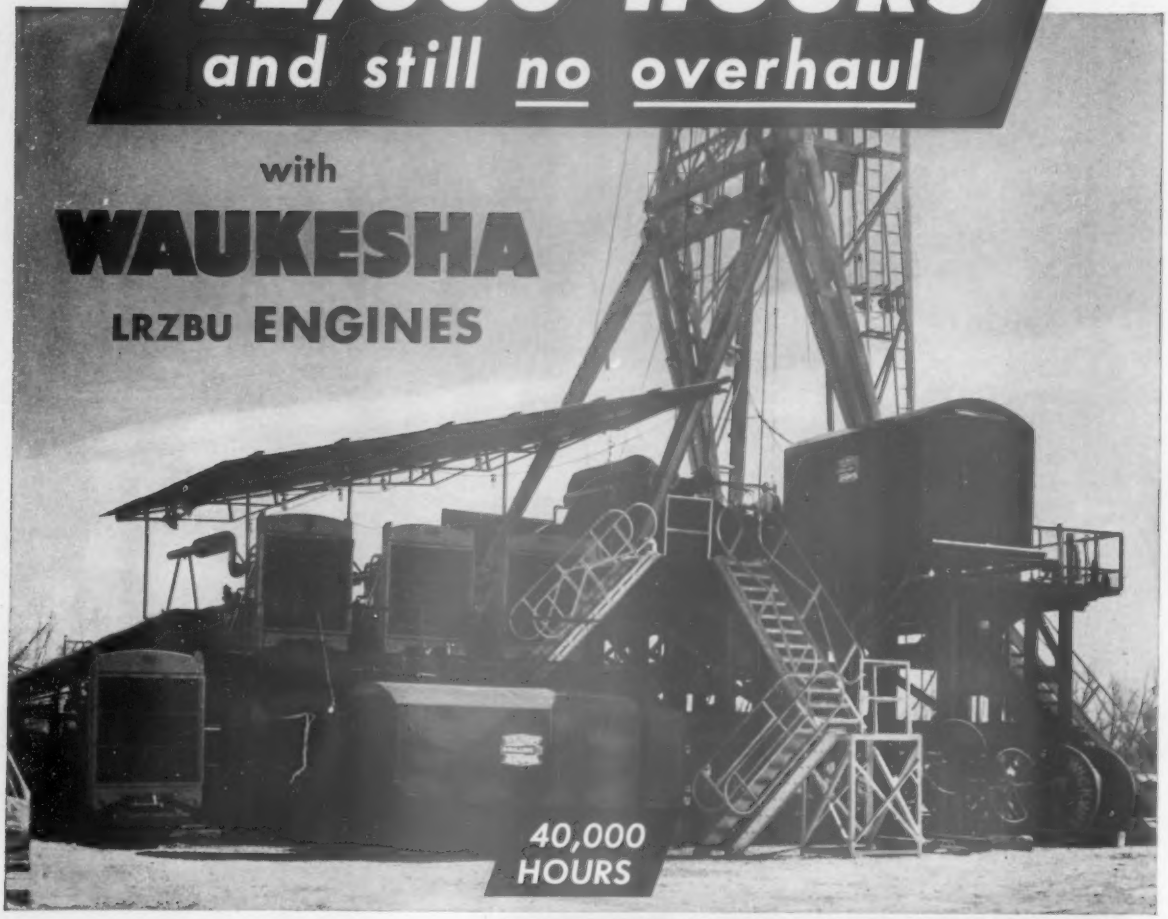
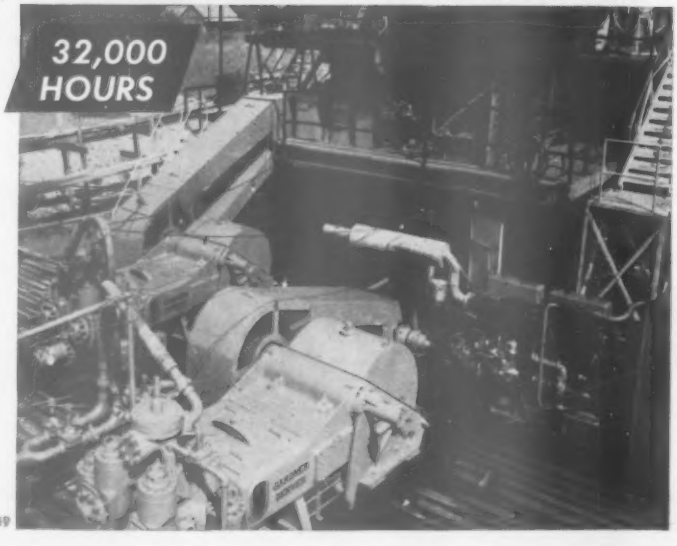
LRZBU ENGINES



Two FRED WILSON DRILLING CO. rigs shown operate in southern Louisiana. Rig 12 has four and Rig 9 has three Waukesha gas power units, Model LRZBU, six cyl., 9⅛-in. bore x 8½-in. stroke, 3520 cu. in. displ. Rig 12 (above) has 40,000 hours service; Rig 9 (right) 32,000 hours. No engine has had any overhaul, and practically no repairs, reports Mr. Fred Wilson . . . these are just some reasons why his equipment is 100% Waukesha powered. He operates six rigs (two each of National 110, 80B and 55 sizes) and sixteen Waukesha LRZBU; three LRO; one each NKU, WAKU, 145-GKU; and several XAHU power units. Send for Bulletins.



449

WAUKESHA MOTOR COMPANY, WAUKESHA, WISCONSIN / New York • Tulsa • Los Angeles
Factories at Waukesha, Wisconsin and Clinton, Iowa

ENGINEERING NEWS

NATIONAL AIROIL BURNER CO., INC. • 1284 E. Sedgley Ave. • Philadelphia 34, Pa.

You may wish to check certain items in this advertisement and forward to those concerned in your company.

ROUTE TO:

_____

_____

_____

_____

Have You Investigated National Airoil Universal Register Units?

These efficient members of the National Airoil family of quality products are available in a wide range of models including the swing-type shown above.

This particular unit can be furnished with gas burners, ring or cylindrical type, and/or oil burners.

All vanes are variable independently of each other, and reversible from left to right turbulence (or vice versa) as a unit. The integral damper disc permits closing-off each individual burner tile to prevent air leakage on shut-down.

Engineering data on other National Airoil Universal Register Units from 60 to 500 gph are available upon request. Write for Bulletin 51A.

Here's a Reliable Way to Prepare Heavy Fuel Oil for Combustion

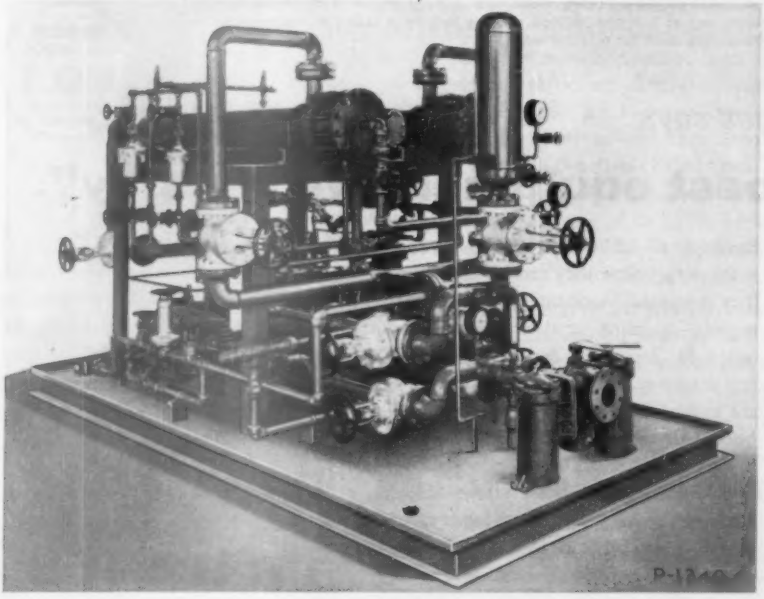
If your heating problem involves the preparation of heavy fuel oil for combustion, you'll want to investigate the advantages of National Airoil Fuel Oil Pumping and Heating Units.

For example, these reliable, efficient units provide these advantages:

- **even oil pressure and temperature**
- **valving easily understood by operators**
- **designed for a minimum pressure drop**
- **ease of maintenance**
- **space saving**
- **shipped complete ready for service connections**
- **less costly than on-the-job assembly**

National Airoil Fuel Oil Pumping and Heating Units are available in single or duplex units, from 2 to 100 gpm in standard or special models.

Bulletin 40 contains the facts. May we send you a copy?



Do You Have These National Airoil Technical Bulletins In Your Library?

Whatever your industrial heating problem, you'll find a wealth of helpful information in these technical bulletins. Write for any or all of them today.

BULLETIN No. 40. FUEL OIL PUMPING AND HEATING UNITS

16 pgs. Here's the answer to problems involving preparation of heavy fuel oil for combustion. Single and duplex units, from 2 to 100 gpm in standard or special models.

BULLETIN No. 28. AUTOMATIC PACKAGED FIRING UNITS

4 pgs. Steam atomizing automatic firing units for oil and/or gas fuels. Standard unit capacities—from 200 to 830 boiler horsepower (7,200 to 30,000 lbs. of steam per hour). Larger units for special needs.

BULLETIN No. 25. DUAL STAGE OIL BURNERS

4 pgs. Data points out advantages when *both* mechanical and steam atomizing principles are incorporated in a single oil burner. 3 standard sizes are shown.

BULLETIN No. 51A. UNIVERSAL REGISTER UNITS

4 pgs. Data offered on full line of these quality National Airoil products with capacities ranging from 60 to 500 gph.

BULLETIN No. 21. STEAM ATOMIZING OIL BURNERS

16 pgs. Describes "SA" Burner for use where steam or compressed air is available for firing many types of industrial process furnaces. 5 sizes have rated capacities from 10 gph to 725 gph.

Macks are the muscles of the oil fields. Here one of Bill Hodges' B-61 Model Macks places heavy machinery at drill site. Rutted, muddy footing is taken in stride because **Mack oil field trucks are built for oil field work.**

MACK
for over 7 straight years
NO.1
by far in sales of diesel trucks

Oil field trucker Bill Hodges says

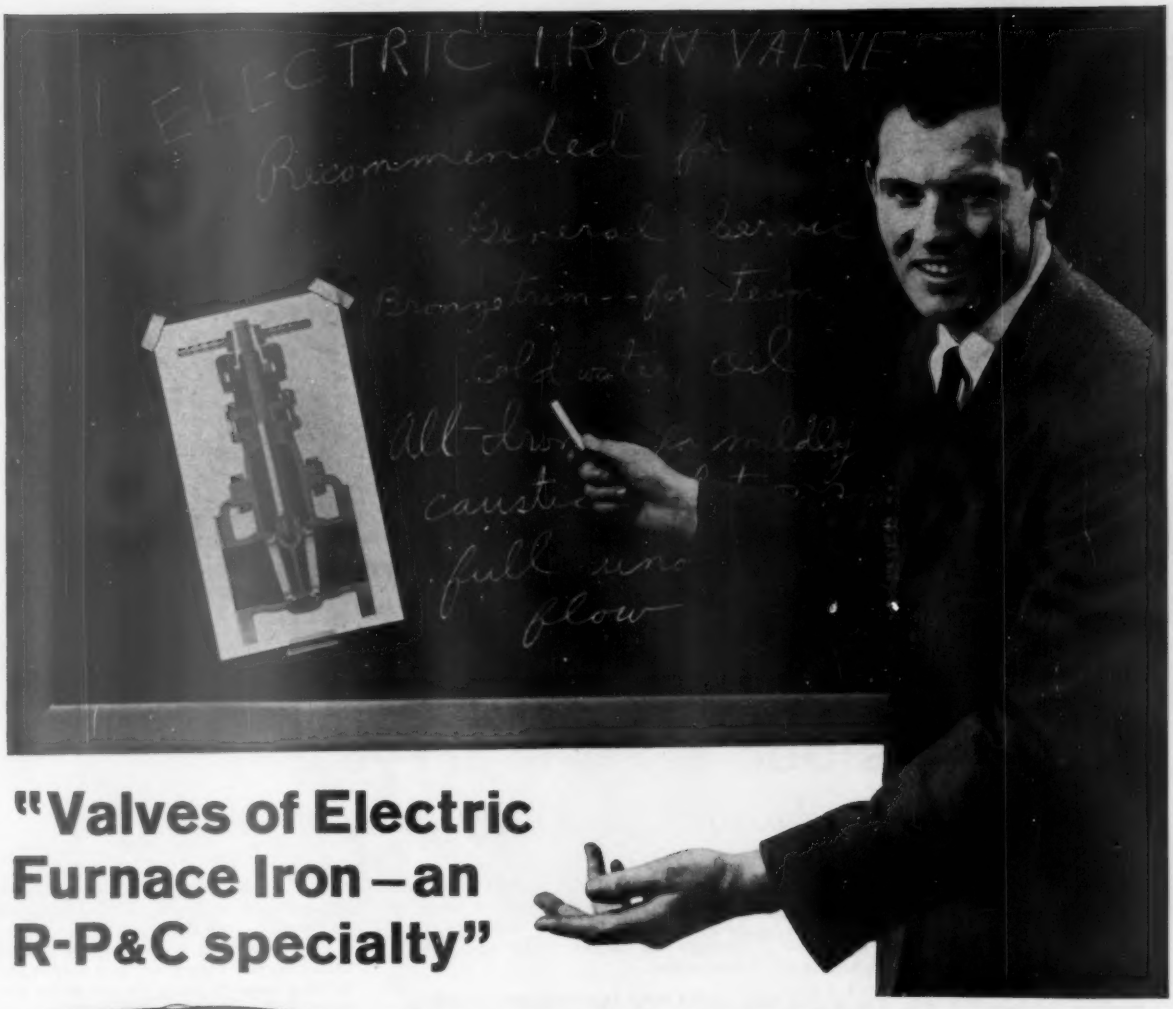
"We use the best equipment we can buy"

"It doesn't pay to fool around with 'bargain' equipment in the oil fields," says Bill Hodges, head man at the Oklahoma City trucking company that bears his name. "Hundreds of rig moves have taught us the value of quality equipment. From trucks on down, every piece of equipment we use is one grade – the best."

Bill Hodges Truck Co. operates dozens of Macks . . . has units to handle loads up to 160,000 lbs. Macks have the capacity, the power, the rugged strength and flexibility to deliver rigs, equipment and machinery where they're wanted, when they're wanted. Mack-built Thermodyne® engines – gasoline or diesel – are unexcelled for long life, dependability and fuel economy. Mack-built transmissions are available up to 20 speeds, and are built to accommodate power takeoff units. On 6-wheel units, Mack's Balanced Bogie with Power Divider allows Mack trucks to move the heaviest loads over the roughest oil-field terrain by automatically applying controlled torque to the axle with greater traction.

In oil field work where more is demanded of a truck, you'll get more out of a Mack. Your Mack branch or distributor will be glad to show you why. Mack Trucks, Inc., Plainfield, New Jersey. Mack Trucks of Canada, Ltd., Toronto, Ontario. 7714

MACK
FIRST NAME FOR
TRUCKS



"Valves of Electric Furnace Iron—an R-P&C specialty"

"Manufacturing castings from iron melted in our own electric furnaces and to our own specifications has long been an R-P&C specialty. Recognized for their superior quality, these castings of **highly refined metal** are substantially free of impurities. Dense grain structure gives them a high resistance to corrosion, high tensile and transverse strength, plus excellent deflection characteristics. In fact, their **physical properties far exceed** the standard requirements for iron valve castings. And all of these advantages are available to you in R-P&C Electric Furnace Iron Valves at no extra cost."

Shown here is an R-P&C Gate Valve of the flanged end type. It is available in sizes from 2" to 24" in bronze trim or all-iron construction. The R-P&C Iron Valve line includes other popular types of Gate, Globe, Angle and Swing Check Valves—all made of Electric Furnace Iron.

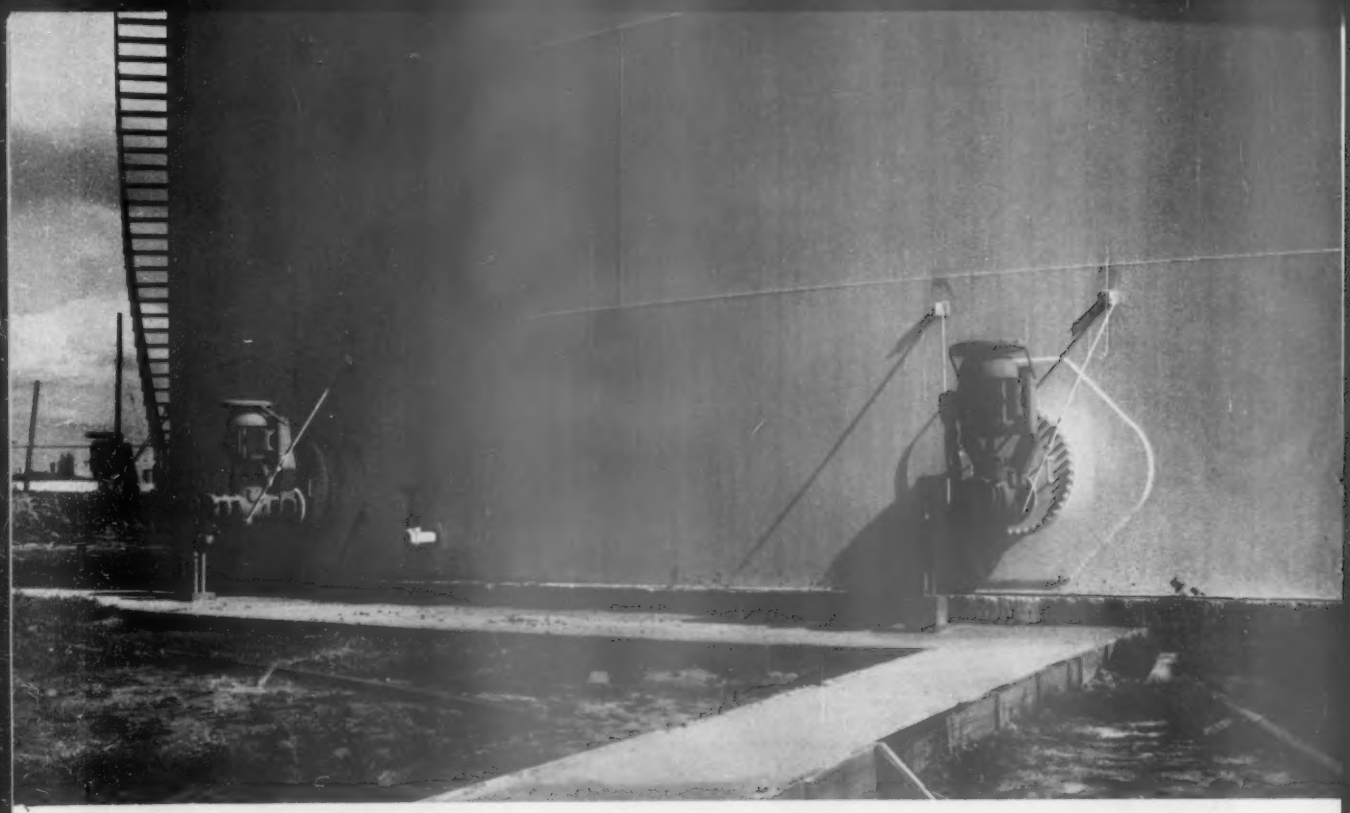
Contact your R-P&C distributor. He can supply you promptly with any Iron Valve you need as well as gate, globe, angle and check valves in bronze, cast steel and forged steel; all in a wide range of sizes, styles and pressure classes. See him or write...

R-P&C VALVES

ACCO

R-P&C Valve Division, American Chain & Cable Company, Inc.

Reading, Pa., Atlanta, Boston, Chicago, Denver, Detroit, Houston, New York, Philadelphia, Pittsburgh, San Francisco, Bridgeport, Conn.



You save $1000 per tank per year

when you keep bottoms clean by pressing a button

Take a minute to add up what it costs you to clean out the sediment in an 80,000-barrel crude storage tank.

The answer—5000 to 8000 dollars—may amaze you. Yet these figures are based on careful field studies by a major pipeline company.

Your total cost includes:

- what you pay for cleaning
- your overhead while the tank is out of service
- value of refinable oil and wax you lose in the bottoms (at least $2000—and sometimes as high as $6000).

Fortunately, this is one expense you don't have to accept. Prevention is easy.

Put LIGHTNIN Mixers on your tanks, and start enjoying savings *on the order of $1000 per 80,000-barrel tank per year.* Savings on larger tanks are equally spectacular.

No need to scrape out sludge

You eliminate sludge buildup—for good—when you install LIGHTNIN Mixers. By pressing a switch button, you start the tank contents in gentle motion that keeps sediment suspended in the crude, or resuspends any that has settled. You can keep bottom sediment level, year to year, as low as *one inch.*

You dispatch a more uniform crude when you use LIGHTNINS in your tanks. Crude leaving the tank has the same values as when it entered the tank. You overcome the risk of large slugs of accumulated sediment breaking loose and moving into the pipeline.

By eliminating downtime for sludge cleanout, you keep your tank farm's *full holding capacity* ready for use when you need it. You gain as much as 12% more storage capacity—without adding a single tank.

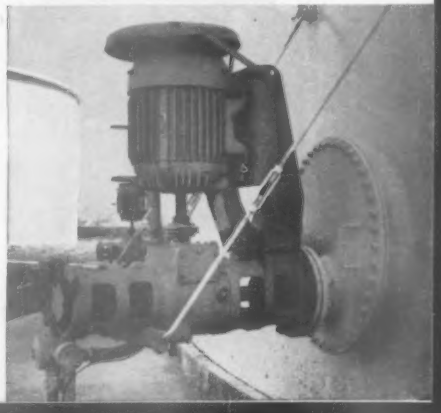
Do this today

More than 50 independent pipeline companies and about 35 leading producers and refiners are cutting crude storage costs this effortless LIGHTNIN way. So can you! To see how, just call in your LIGHTNIN Mixer representative (listed in Pipeline Composite Catalog). Or write us direct.

Lightnin® Mixers

MIXCO fluid mixing specialists

LOW OPERATING COST. It takes as little as one hour to suspend sediment in a full tank. Upkeep is simple; choice of stuffing boxes to meet your conditions, or mechanical seals that eliminate stuffing-box maintenance.



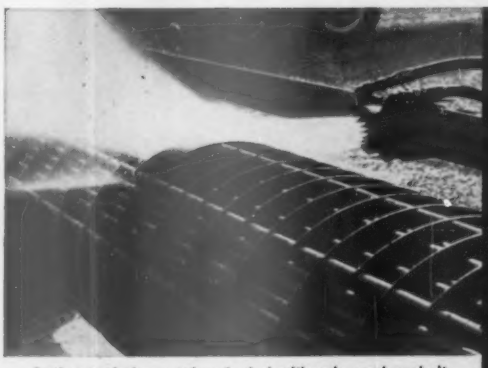
Get these helpful bulletins on BS&W control and LIGHTNIN Mixers. Check, tear out and mail to us today with your name and company address. Free—no obligation.

- ☐ BS&W Control with LIGHTNIN Mixers (B-503)
- ☐ Side entering mixers, 1 to 25 HP (B-104)
- ☐ Data sheet for figuring mixer requirements (B-107)
- ☐ Condensed catalog describing LIGHTNIN Mixers—all types (B-109)
- ☐ LIGHTNIN rotary mechanical seals for extra-low-cost mixing (B-111)

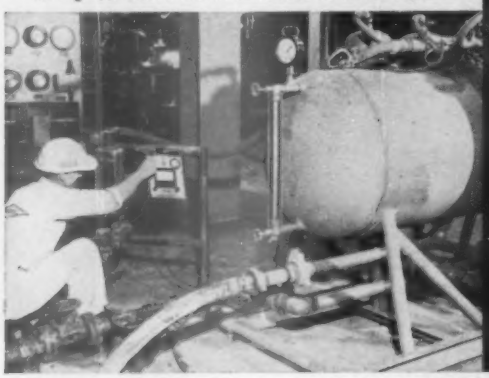
MIXING EQUIPMENT Co., Inc., 174-g Mt. Read Blvd., Rochester 3, N.Y.

In Canada: Greey Mixing Equipment, Ltd., 100 Miranda Avenue, Toronto 19, Ont.

A new mark for a nation-wide cleaning service . . . DOW



Jetting tool cleans tubes fouled with coke and asphalt.



New mobile foam-cleaning equipment cuts cleaning costs.

Cleaning missile lines and components requires tolerances as close as 150 microns.

DOW INDUSTRIAL SERVICE

Industrial Cleaning. Dow Industrial Service, now a separate division of The Dow Chemical Company, offers the only nation-wide chemical cleaning service for virtually all types of industrial processing equipment. This is an expansion of the cleaning service developed over the past 20 years. Dow is currently servicing entire plants as well as doing special cleaning jobs for both large and small companies.

Dow Industrial Service research in industrial chemical cleaning has developed specialized mobile equipment and techniques, some of which are pictured above. These highly efficient techniques are improving plant productivity and reducing equipment downtime in all industries using steam generators, condensers, heat exchangers, towers, water and product lines, water wells and tanks, or similar process equipment.

Product Sales and Service. The sale of specialized chemical products, scientifically formulated to be of use in specific industrial processes and to give the necessary technical service in their use, is the job of Product Sales and Service. Purifloc* N17 is an outstanding new flocculant cleared by USPHS for use in potable water.

Laboratory Service. Because of the rapid development of chemical products for the municipal and industrial waste and water treatment areas, Dow Industrial Service will take on the service-selling of those products. Also, a consulting laboratory service for municipal and industrial waste and water treatment is provided.

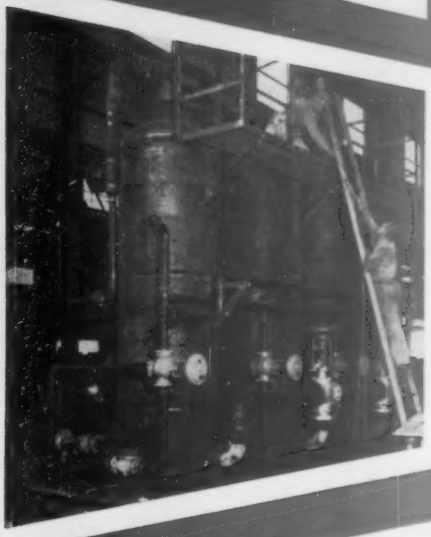
You'll find Dow Industrial Service offices and stations with specialized cleaning equipment and experienced personnel in all major industrial areas. For more information, write to Dow Industrial Service, 20575 Center Ridge Road, Cleveland 16, Ohio.

*TRADEMARK

DOW INDUSTRIAL SERVICE DOW *Division of THE DOW CHEMICAL COMPANY*

SUPERIORITY

FROM START TO FINISH...



150 DAU'S ARE NOW ON STREAM

For superior performance and maximum profits, specify Parkersburg equipment. Parkersburg quality products are backed by the know-how of men trained to think in terms of customer satisfaction and the job to be done. For example, you profit by Parkersburg's precision pre-engineering . . . every DAU is completely test-assembled in the plant to assure fast field assembly and efficient operation. After start-up, the Parkersburg DAU chalks up additional profits in **maximum hydrocarbon recovery** from your gas stream, with **complete dehydration** as an extra bonus at no extra cost. This is why old customers reorder and new customers are buying **Parkersburg** DAU's — the outstanding name in the oilfield.

AND THE DEMAND IS GROWING!

WHEN YOU BUY PARKERSBURG YOU GET 'EM ALL!

ENGINEERING . . . Parkersburg patents the process, not just the equipment.

MANUFACTURING . . . Parkersburg units are backed by rigid systems of quality control.

INSTALLATION . . . Parkersburg equipment installations are supervised by experts.

SERVICING . . . Parkersburg trains your men, services your unit any time, anywhere.

SEE YOUR PARKERSBURG MAN TODAY!

THE PARKERSBURG RIG & REEL COMPANY
Division of Parkersburg-Aetna Corp.

PARKERSBURG • HOUSTON • COFFEYVILLE

PARKERSBURG—The FULL LINE in Pressure Vessels . . . Separators, Metering Equipment, Treaters, Heaters, Knockouts and Oil Skimmers, Scrubbers, Hyrecos, Hydrocarbon Recovery Units, Glycol Dehydrators, Stabilizers.

FIELD REPORT

FLOOD: New Harmony Unit

OPERATOR: Superior Oil Company

PUMPS: 4 Aldrich Quintuplex

FLOODING STARTED: May, 1957

EXPERIENCE TO DATE: Pumps continuously deliver mixture of fresh and produced water to two formations — 16,000 bbl/day at 1,450 psi.

Customer reports: "Aldrich pumps were selected because previous experience plus new improvements indicated that they better fulfilled our requirements.

"Pumps handling fresh water only have not been repacked since operation began thirty months ago."

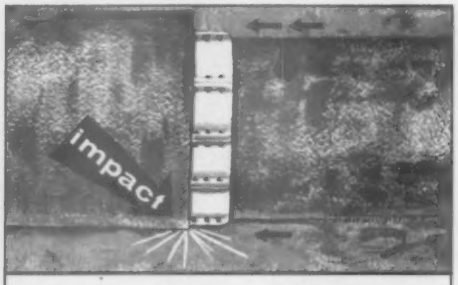
Field parts stock available in Carmi, Ill.; Calgary; Casper, Wyoming; Charleston, W. Va.; Houston; Los Angeles; Odessa and Tulsa. For further information, write the ALDRICH PUMP COMPANY, 9 Gordon Street, Allentown, Pa.

the tough pumping problems go to ALDRICH

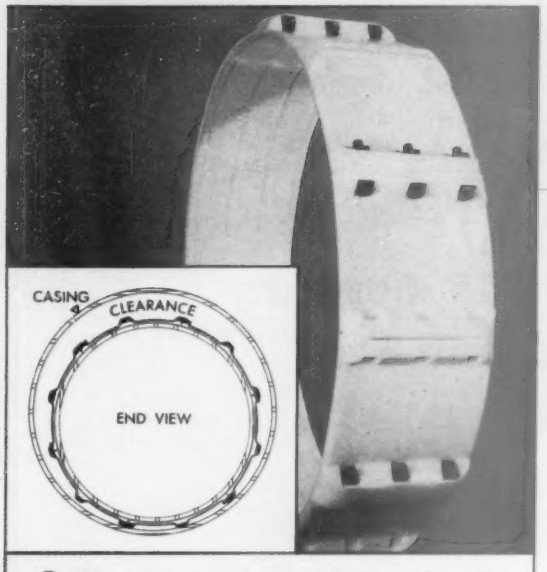
NEWS FROM DOWN THE LINE!

WmSON BIG-INCH M-2 THINSULATORS® MEET RUGGED TEST IN NEW JERSEY TURNPIKE CROSSING

❶ "We'll pull the 36" drag section through this 275' casing. The casing has a slight dog-leg in the center which will make the pull a really tough test of the THINsulators."



❷ "M-2 THINsulators are high-density polyethylene products, resistant to fracture under tremendous impact. Most other plastic insulators are fiberglas reinforced polyesters that don't have the impact resistance, so breakage rates are high."



❸ "The high density polyethylene gives the M-2 such strength it can be made more compact than other insulators, allowing more clearance. It's flexible, so it conforms to the pipe for uniform coating loading . . . and the low coefficient of friction makes it slide like it's greased."

❹ "The tremendous force of the pull caused the lead THINsulator to absorb most of the shock. It twisted slightly but remained intact. All hands agree this is the best plastic casing insulation they have used."

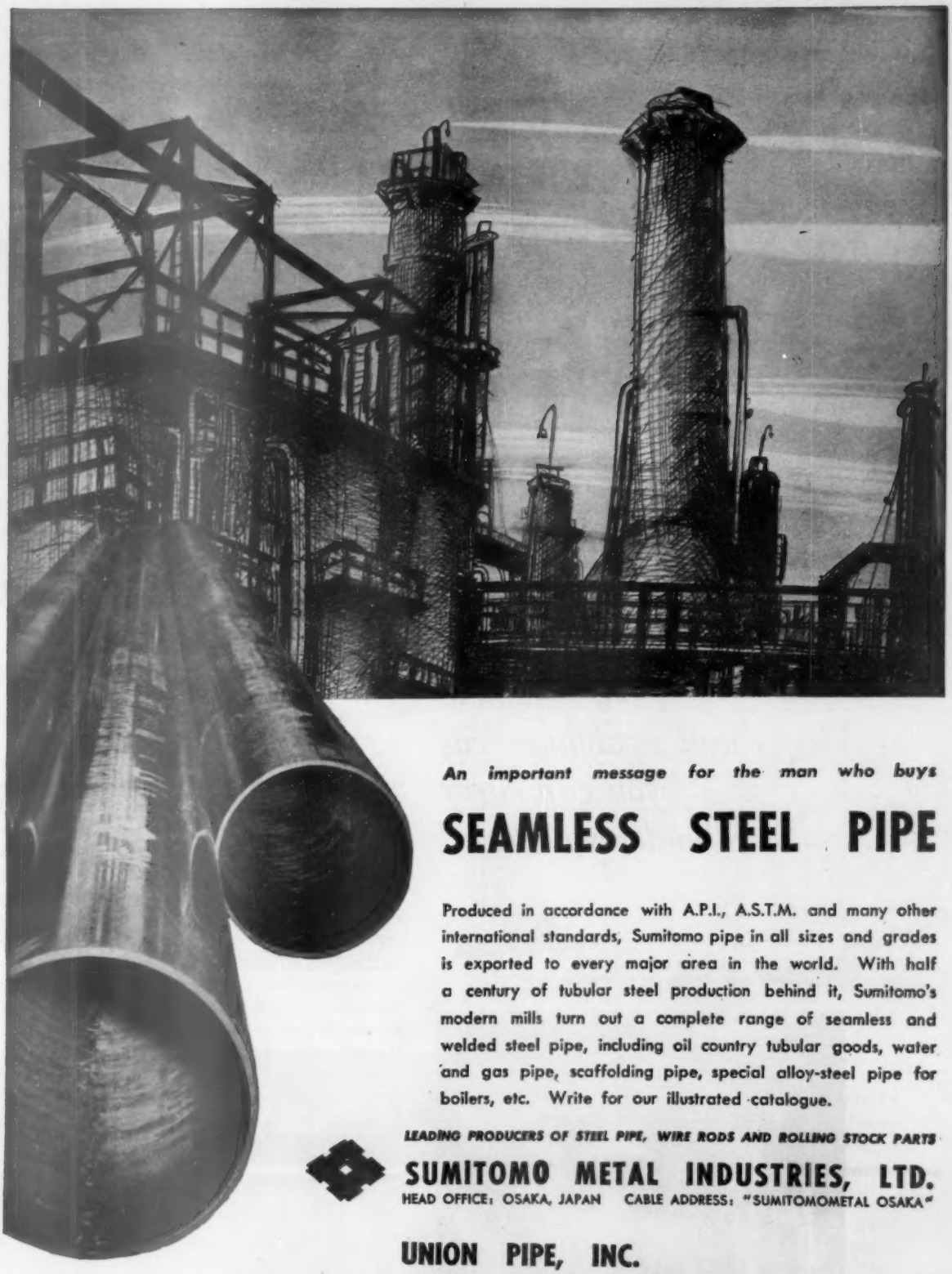
❺ "Consider the economy of M-2 THINsulators. They cost no more than other plastic insulators, and breakage is **practically unknown.** Bend 'em, beat 'em, you can't break 'em."

T.D.Williamson, Inc.

P. O. BOX 40 • TULSA 2, OKLAHOMA

REPRESENTATIVES AROUND THE WORLD

Write Dept. A for Technical Bulletin on the M-2 THINsulator



An important message for the man who buys

SEAMLESS STEEL PIPE

Produced in accordance with A.P.I., A.S.T.M. and many other international standards, Sumitomo pipe in all sizes and grades is exported to every major area in the world. With half a century of tubular steel production behind it, Sumitomo's modern mills turn out a complete range of seamless and welded steel pipe, including oil country tubular goods, water and gas pipe, scaffolding pipe, special alloy-steel pipe for boilers, etc. Write for our illustrated catalogue.

LEADING PRODUCERS OF STEEL PIPE, WIRE RODS AND ROLLING STOCK PARTS

SUMITOMO METAL INDUSTRIES, LTD.
HEAD OFFICE: OSAKA, JAPAN CABLE ADDRESS: "SUMITOMOMETAL OSAKA"

UNION PIPE, INC.
AGENT OF OIL COUNTRY TUBULAR GOODS & LINE PIPE IN U.S.A.
420 LEXINGTON AVENUE, NEW YORK 17, N.Y.

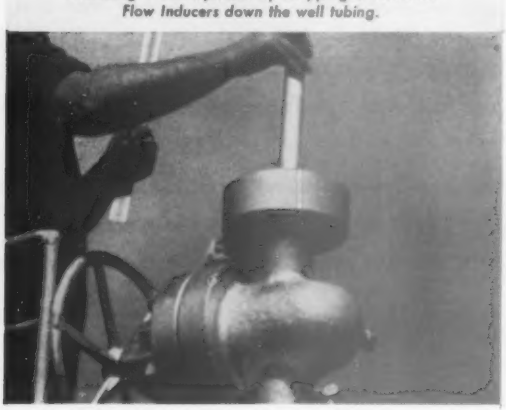
a complete well swabbing "rig" you can carry under your arm!

SWABSTIX* Flow Inducer, the newest and one of the most revolutionary products ever developed through Tretolite research, now makes it possible for oil wells to be swabbed through *chemical* action.

This remarkable achievement has far-reaching significance for the petroleum producing industry. It means that fluid-logged wells that have temporarily lost flow can be brought into production without waiting for mechanical swabbing equipment to become available, for bad roads to become accessible, for swabbing rigs to be transported to hard-to-reach offshore or bayou locations. New wells which may require swabbing to induce flow can also be activated by SWABSTIX applications.

SWABSTIX Flow Inducer treatment is a one-man operation requiring no equipment other than a wrench to gain access to the well tubing. To swab the well, sticks of SWABSTIX Flow Inducer (each 1¼″ in diameter and 24″ long, packaged six to a carton) are simply dropped down the tubing—certainly the most convenient swabbing method ever devised. Oil flow is started quickly and easily.

Swabbing is accomplished by dropping SWABSTIX Flow Inducers down the well tubing.



*Registered trademark, Petrolite Corporation

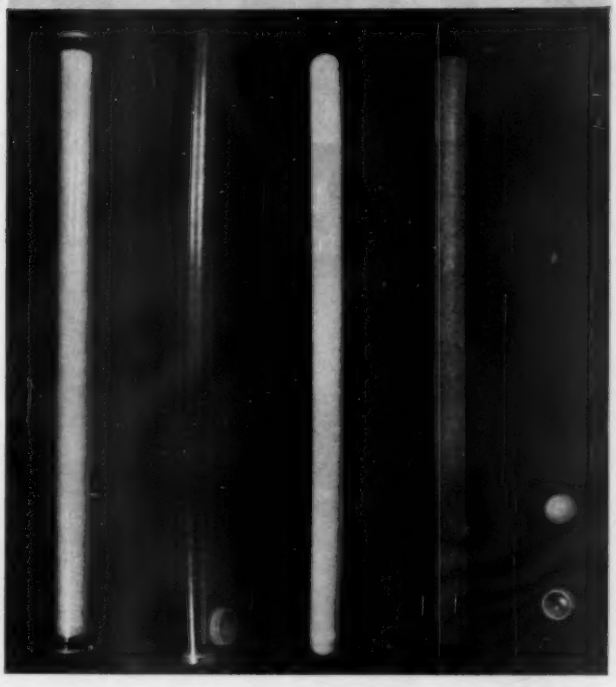
FLOW INDUCER

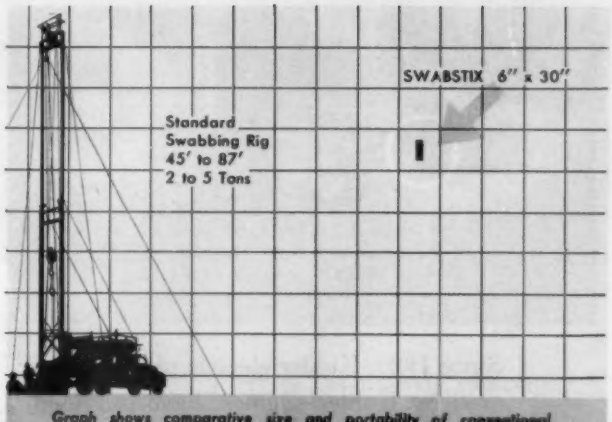
restore oil flow the new chemical way

Each SWABSTIX Flow Inducer unit consists of a water-soluble, oil-insoluble plastic cylinder filled with a powdered chemical. Because the cylinder is oil-insoluble, it remains intact while traveling through the oil phase in the fluid-logged well tubing. Upon reaching the water stage, the cylinder dissolves and the released chemical rapidly generates gas by reaction with water. This gas increases in volume as it rises toward the surface, displacing fluids which are discharged at the well head.

SWABSTIX Flow Inducers do not work miracles—they cannot cause a well to flow if it is incapable of flowing. Properly used, however, they provide a more convenient and faster swabbing application than is possible with conventional mechanical methods.

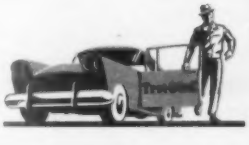
SWABSTIX Flow Inducer components are (from left): unit package, outer polypropylene tube and caps, chemical unit, water-soluble tube and end caps.





Graph shows comparative size and portability of conventional mechanical swabbing rig and SWABSTIX carton.

Ask the Man in the Red Car to explain more about the use of this new Tretolite product, or write for SWABSTIX brochure just published.



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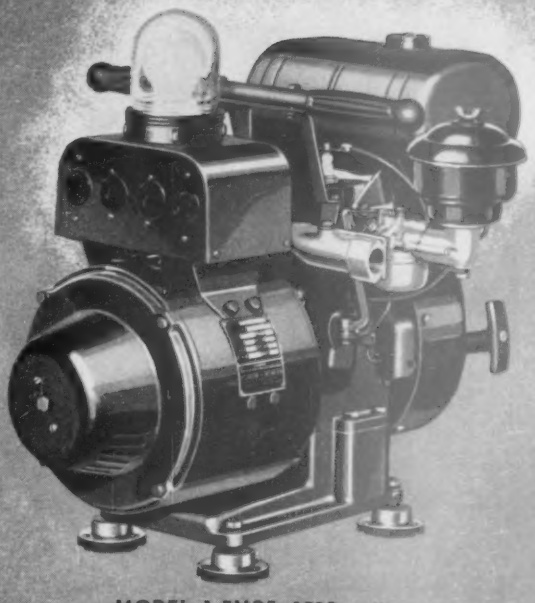
POWER with a reputation for rugged reliability

KOHLER ELECTRIC PLANTS



MODEL 1.5M25, 1500 watts.
Powered by a Kohler engine.
Sizes to 100 KW gasoline or diesel

KOHLER ENGINES

4-CYCLE • SHORT STROKE • AIR-COOLED

MODEL K161
Sizes from 4 to 24 H.P.

Since 1920, Kohler electric plants, powered by Kohler engines, have provided a host of users with reliable, efficient electric power for sole supply, automatic stand-by and marine needs.

Also powered by Kohler engines are many kinds of equipment, produced by numerous leading companies, for use in construction, agriculture and industry.

With long experience in the production of internal combustion engines and electrical generating sets, Kohler Co. emphasizes ruggedness, conservative rating, ease of maintenance, ease of starting. Sales and service nation-wide. Write for illustrated printed matter.

KOHLER CO. Established 1873 KOHLER, WIS.

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They Say—

A rig for only $125

Dear Sir:

I am again asking you to mail me your weekly Oil and Gas Journal for the coming 2 years and enclose my check.

Last time I visited your fine publishing plant was in May 1953. I was in oil newspaper publishing many years ago and at one time owned the old eastern Oil Man's magazine, a more or less news magazine interspersed with oil-field poems and oil-field stories and a lot of oil-field history.

I got The Oil and Gas Journal all the time after you bought it from Holly Reavis, who, I believe, called it the Oil Investors Journal.

We have surely seen a lot of things happening to our oil industry. I saw wells drilled here in the east with all home-made machinery. Our crews used to enter the West Virginia forests, cut and hew out the old standard 20 by 20 by 84-ft. wood derrick foundation timbers and build the bull wheels, band wheels, make the shaft, set the engine block for the old steam engine, all in 5 days and they charged the contractors $125 for building such rigs in 1906 to 1910-12.

No one here knows what an old cable tool drilling rig looks like. The spudders have taken over here and the rotaries out there, so the horizon in the oil fields does not look the same.

Herbert McGinnis
Parkersburg, W. Va.

Why give away gasoline?

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"More dollars change hands in marketing than in any other single segment of the petroleum industry. Yet, the best description I can think of for some of our marketing practices is "sheer insanity."

"Economically, this is splendid for the consumer, but not for our own earnings statement. It is in the market place that we seem to put on our best demonstration of business inability.

"Just take a look at gasoline marketing in Los Angeles. This is the

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largest single gasoline market in the world. At the same time, it is one of the most erratic in terms of gasoline prices. I have seen prices change two and three times a day at some service stations.

"Nothing will have happened to costs at the refineries—and certainly nothing will have happened to demand for gasoline. Apparently someone gets the urge to pick up customers by reducing prices. Then everyone else reduces prices to keep from losing their customers.

"What happens? No one loses customers; everybody loses money.

"Frankly, I don't know how the gasoline marketing problem will be solved, and I do not want to leave the impression that I am opposed to competition in marketing because I am not. But I can't find justification for the fact that we're giving product away."

George F. Getty II, president, Tidewater Oil Co., in a speech to the American Association of Petroleum Landmen.

Taxes handicap Louisiana

"Louisiana, with its high taxes, must compete—unfavorably—against other oil producing states and now, ironically, against the government's tideland reserves.

"The extent of this self-imposed disadvantage is illustrated by comparisons of the severance, or similar, taxes in this and other major oil-producing states.

"Louisiana and the oil industry ought to get on well together, for they need each other.

"Oil, gas, and their processed products supply about half of this state's total tax revenue.

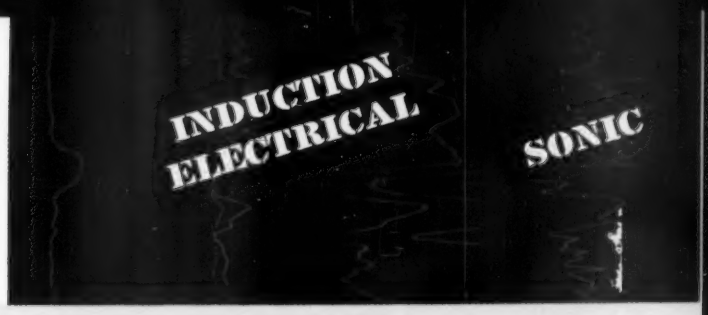
"Conversely, the refiners of petroleum products and the makers of petrochemicals need Louisiana with its vast resources of natural gas and water, no less than of oil.

"But full development of these resources depends upon financial arrangements mutually advantageous to the state and to the industry.

"With so much at stake the administration and the legislature would do well to make a study of the state's competitive position in the industry. But the cry for more and more revenue may put off the day of appraisal until serious damage is done."

Editorial in the New Orleans Times-Picayune.

Letters to They Say should be addressed to The Editor, The Oil and Gas Journal, Box 1260, Tulsa, Okla.



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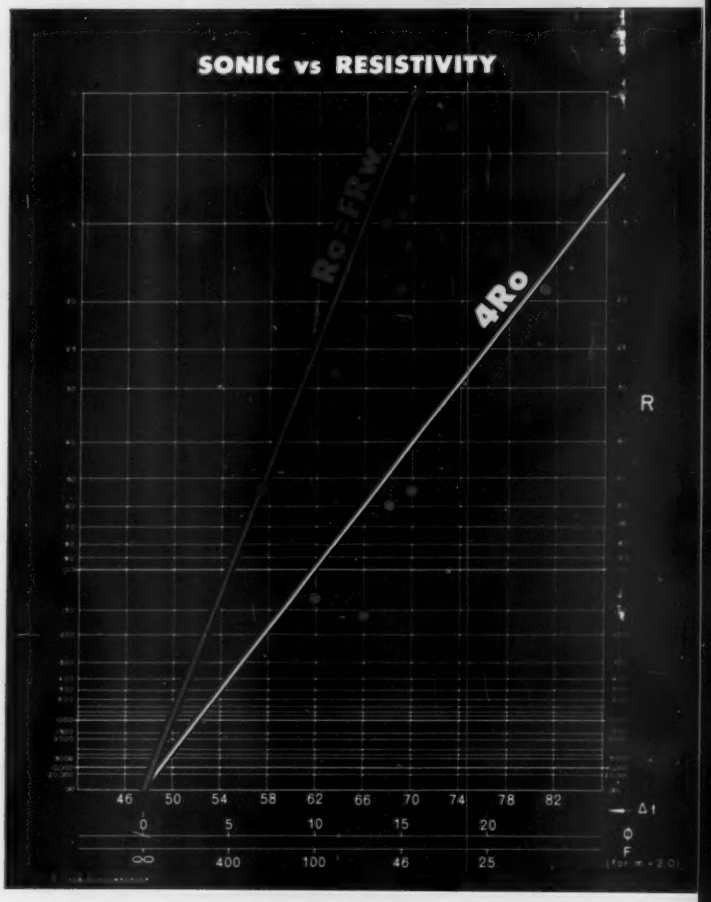
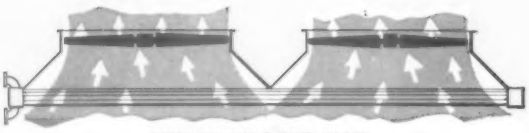


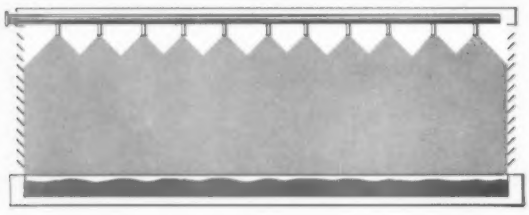
Should Process Plant Cooling Systems Use..

AIR ——



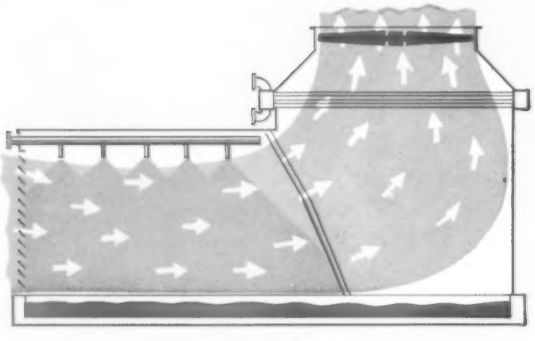
HUDSON SOLO-AIRE UNITS

WATER ——



HUDSON COOLING TOWERS

or a combination of
AIR AND WATER ——



HUDSON COMBIN-AIRE UNITS

The answer is found only through comparisons of economics of air, water or a combination of the two for cooling each process stream, and incorporating the results in one integrated cooling system. Factors to be considered include desired effluent temperature of each process stream; summer and winter ambient dry and wet bulb temperatures; availability and quality of water; possibility of public water pollution; space available; and first cost, maintenance cost, and operating cost of equipment.

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CALENDAR OF EVENTS

JULY

18-29 Massachusetts Institute of Technology, dynamics and control of chemical engineering processes program, Cambridge, Mass.

28-30 American Petroleum Institute, Division of Production, Eastern district meeting, The Greenbrier, White Sulphur Springs, W. Va.

29 Southern Gas Association, transmission section roundtable conference on use of electronic computers by engineering personnel, and employe relations section accident prevention roundtable conference, Baker Hotel, Dallas.

AUGUST

3-5 Wyoming Geological Association, field trip to Snyder basin and Wind River Mountains, Casper.

14-19 National Congress of Petroleum Retailers, Inc., annual session, Shamrock-Hilton, Houston.

15-16 North Dakota Oil and Gas Association, annual meeting, Grand Pacific Hotel, Bismarck.

15-17 American Society of Mechanical Engineers, American Institute of Chemical Engineers, heat transfer conference and exhibit, Statler Hilton Hotel, Buffalo, N. Y.

15-26 Sacramento State College, summer institute on nondestructive testing, Sacramento, Calif.

19 Southern Gas Association, roundtable conference on pipeline engineering, Mayo Hotel, Tulsa.

22-26 Gordon Research Conference, catalysis, Colby Junior College, New London, N. H.

29-31 Appalachian Gas Measurement Short Course, University of West Virginia, Morgantown, W. Va.

30-Sept. 2 American Association for the Advancement of Science, Alaska Division, eleventh Alaskan science conference, Anchorage.

SEPTEMBER

6-7 Chemical Institute of Canada, organic chemistry division conference, Edmonton.

7-9 American Society of Mechanical Engineers, joint automatic control conference, Massachusetts Institute of Technology, Cambridge, Mass.

7-10 Billings Geological Society, annual field trip, Hebgen Lake-Madison Valley area of southwestern Montana.

8-9 National Research Council, Chemical Institute of Canada, tenth Canadian high polymer forum, Alpine Inn, Montreal.

8-9 Mid-Continent Oil and Gas Association, Louisiana-Arkansas division, annual meeting, Roosevelt Hotel, New Orleans.

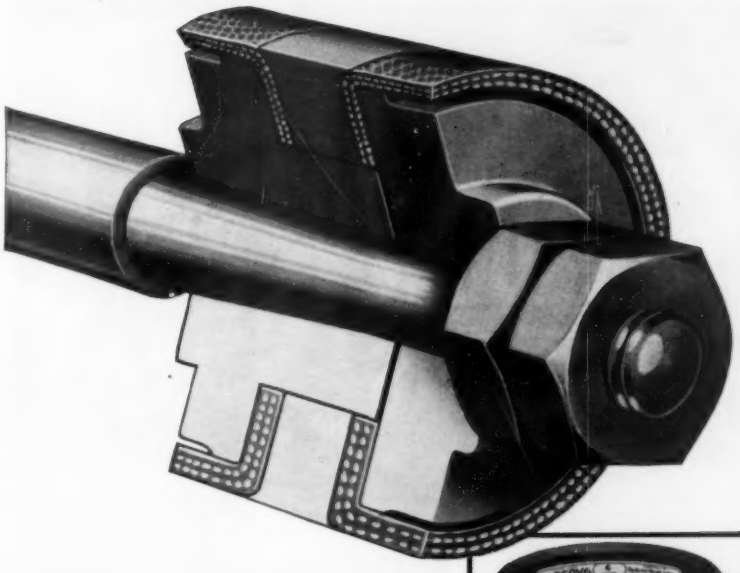
8-10 Chemical Institute of Canada, western regional conference, Regina.

8-10 Intermountain Association of Petroleum Geologists and Eastern Nevada Geological Society, field trip, economic geology of east-central Nevada.

11-16 American Chemical Society, national meeting, New York City.

14-15 Western Petroleum Refiners Association, Rocky Mountain regional technical-industrial relations meeting, Henning Hotel, Casper, Wyo.

14-16 National Petroleum Association, an-



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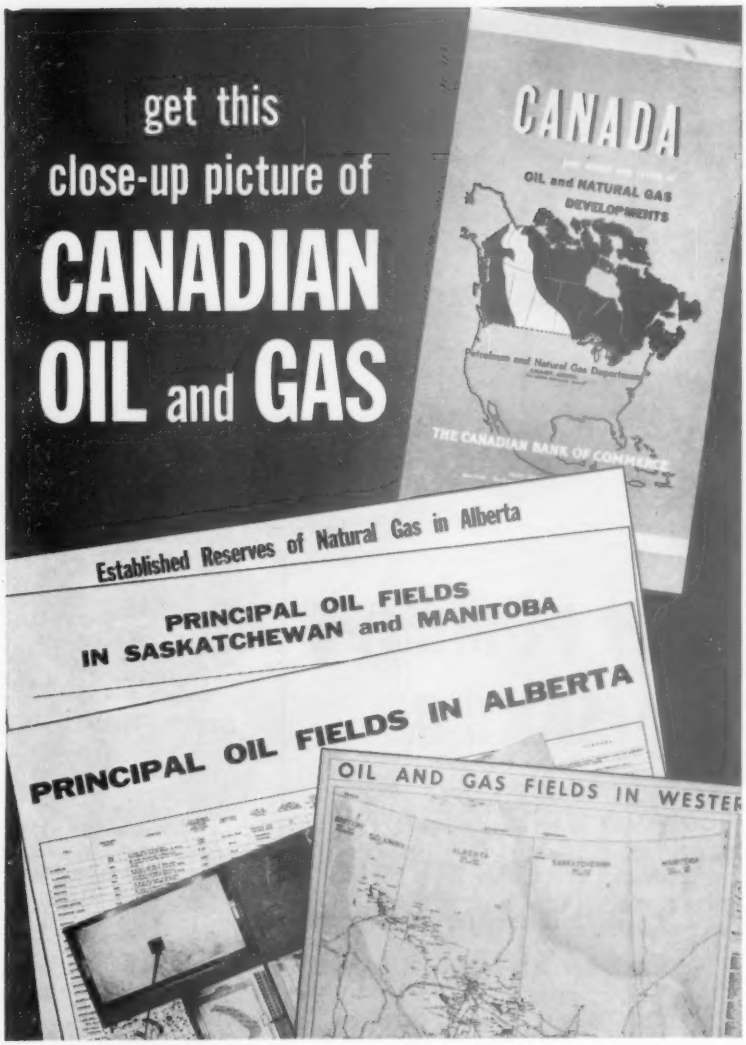

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nual meeting, Traymore Hotel, Atlantic City, N. J.

14-16 National Industrial Conference Board, eighth annual marketing conference, Waldorf-Astoria Hotel, New York.

15 Natural Gasoline Association of America, Rocky Mountain regional meeting, Palliser Hotel, Calgary.

15-16 American Institute of Mining, Metallurgical, and Petroleum Engineers, annual engineering management conference, Morrison Hotel, Chicago.

16-17 Kansas Geological Society, twenty-fifth annual field conference, northeastern Oklahoma, Western Hills Lodge, Wagoner, Okla.

18-21 American Society of Mechanical Engineers, petroleum mechanical engineering conference, Jung Hotel, New Orleans.

19-21 Texas Mid-Continent Oil and Gas Association, annual meeting, Hilton Hotel, San Antonio, Tex.

21-23 Pacific Coast Gas Association, annual meeting, Westward Ho Hotel, Phoenix.

25-27 American Association of Oilwell Drilling Contractors, annual meeting, Roosevelt Hotel, New Orleans.

25-28 American Institute of Chemical Engineers, meeting, Mayo Hotel, Tulsa.

25-28 American Institute of Electrical Engineers, petroleum industry committee, electrical conference of the petroleum industry, Hotel Skirvin, Oklahoma City.

26-29 American Welding Society, fall meeting, Penn-Sheraton Hotel, Pittsburgh.

26-30 Instrument Society of America, instrument-automation conference and exhibit, and fifteenth annual meeting, Coliseum, New York.

27-29 Mid-West Gas Association, annual school and conference, Memorial Union, Iowa State College, Ames.

29-30 Mid-Continent Oil and Gas Association, Mississippi-Alabama division meeting, Grand Hotel, Point Clear, Ala.

29-Oct. 1 West Texas Geological Society, field trip, Delaware Basin of West Texas and southeast New Mexico.

OCTOBER

2-5 Society of Petroleum Engineers of AIME, annual fall meeting, Denver.

3-4 Independent Natural Gas Association of America, annual meeting, Fontainebleau Hotel, Miami Beach.

4-5 University of Kansas, gas-measurement institute, National Guard Armory, Liberal, Kans.

6-7 National Association of Corrosion Engineers, annual western region conference, Sheraton-Palace Hotel, San Francisco.

6-8 National Association of Corrosion Engineers, southeast region conference, Dinkler-Plaza Hotel, Atlanta, Ga.

6-8 National Academy of Sciences, National Research Council, ninth national clay conference, Purdue University, Lafayette, Ind.

10-12 American Gas Association, annual convention, Atlantic City.

11-14 National Association of Corrosion Engineers, northeast region conference, Prichard Hotel, Huntington, W. Va.

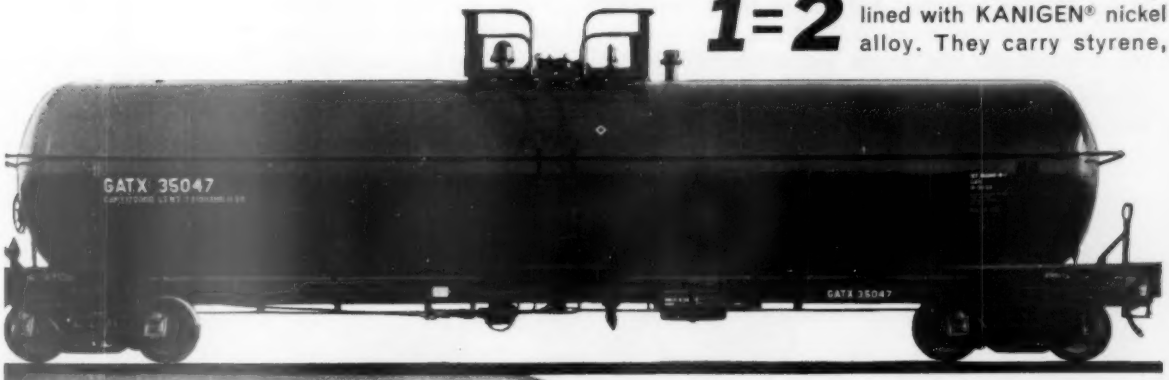
12-14 Southwestern Federation of Geological Societies, annual meeting, Wooten Hotel, Abilene, Tex.

13-14 California Natural Gasoline Association, annual fall meeting, Hotel Miramar, Santa Monica, Calif.

13-16 Taft, Calif., Oildorado, fiftieth anniversary celebration.

HOW TO MAKE 1=2

with GATX 20,000-gallon tank cars. Tank cars are getting bigger and GATX builds more of them. Last year, for example, GATX added four hundred 20,000-gallon tank cars to its fleet. These 20,000-gallon General American tank cars are made of aluminum, or steel, or steel lined with KANIGEN® nickel alloy. They carry styrene, grain alcohol, acetic acid, cyclohexane, lube oil and many other petroleum products.



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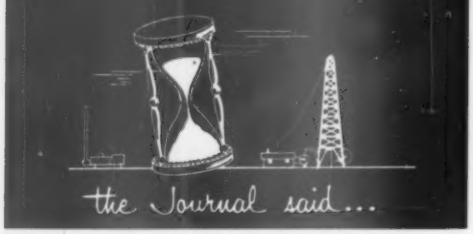


50 years ago

July 28, 1910

California's Governor Gillette threatens to call out state troops to prevent repetition of interference by armed men with locations or drilling in extension areas at Sunset and Midway fields. The threat follows recent clashes between rival oil interests and armed guards.

For first time in years, Humble field drops from first place in production among Gulf Coast fields. Lead is taken by Sour Lake field with sharp increase in oil output to 10,000 bbl. daily. Humble production holds steady at 7,000 bbl. daily. Spindletop becomes lowest producer with daily output of only 3,200 bbl.

Frederick G. Clapp, geological engineer, Pittsburgh, has devised a new method (contouring) of mapping oil fields by which the depth to any sand or sands can be calculated for any point in the field. The method, showing the "lay" of the formations on farm maps, is expected to aid in locating wells and reduce the number of dry holes.

25 years ago

July 25, 1935

Pan American Petroleum & Transport Co., subsidiary of Standard Oil Co. of Indiana, organizes Pan American Production Co. as its producing subsidiary in the Southwest. Headquarters are at Houston with E. R. Turner, formerly of Continental Oil Co., as manager. Its production will supply the Texas City refinery operated by Pan American Refining Corp., sister subsidiary.

The largest gasoline-dispensing barge ever to operate in New York Harbor, and the first of all-welded steel construction, is being placed in service by Colonial Beacon Oil Co. It has a capacity of 100,000 gal., handling aviation gasoline, motor fuel, kerosine, fuel oil, and lubricating oil. All dispensing pumps are electrically powered with current from self-contained generating units.

10 years ago

July 27, 1950

Korean War situation brings fear of steel shortage that shakes oil and other industries. Rush of advance orders for pipe causes steel mill to close books on future deliveries pending government allocation plan. Black market developing.

Midyear review of The Oil and Gas Journal reports completion of 20,258 wells during first half of 1950 to set new all-time record for any comparable period. Record year indicated in oil and gas production, refinery expansion, and pipeline construction.

JOURNALLY SPEAKING

Write a Book

DO YOU want to write a book? If so, The Oil and Gas Journal might publish it for you.

We are now in the book-publishing business—in a small way, that is. From time to time—with increasing frequency, we hope—you will find a book labeled "An Oil and Gas Journal Book." It will also say "University of Oklahoma Press." We're kind of in partnership with the OU Press—well, almost, sort of.

Such a book was released last week: "The Natural Gas Industry," by Edward J. Neuner. You'll find a formal review of it on page 320 of this issue.

Advance notices of this book prompted several of our friends to ask us what the Sam Hill is going on. And that prompted us to write this explanation.

The first question to be cleared up is: "Does the Journal endorse the author's conclusions?"

The answer is an emphatic NO. If we do agree with the author of any book that bears our imprimatur it would be simply by coincidence. It should be clearly understood all around that a book publisher takes no more responsibility for an author's views than the printer who sets the type or the clerk who hands it over a book-store counter.

That question would never arise concerning an old and large book-publishing house. But because the Journal is a magazine and is just getting its big toe wet in the book business, several people asked us if this Neuner book is the Journal's answer to the problems of the gas industry.

The fact is that none of the Journal's editors ever heard of Neuner or his book until our business office was about to sew up the deal with the OU Press.

Of course we endorse Neuner's conclusion that gas production is not a monopoly and doesn't need to be regulated as a utility. But we wouldn't go to the trouble of writing a book to prove what everybody in the business knew all along.

We don't expect gas producers to find a whole lot that's new to them in this book. But it may have some effect on some theoretical economists who have a lot of cockeyed notions about the oil and gas business. The book speaks their language and is sufficiently long-haired to impress them.

And as for Neuner's solution to the problem of regulating gas prices—well, we'll have to think about that one for a while.

He says the root of the trouble is the practice of making long-term dedication and price contracts to pipelines. He says these should be eliminated and that the Federal Power Commission or somebody should set up some sort of field-price posting, or annual bidding, or spot-market system, or something, to get flexibility into gas prices and make them reflect actual market conditions.

Maybe so, maybe not. Perhaps it's worth considering. But don't jump to the conclusion that this is The Oil and Gas Journal's editorial position just because our name appears on the book as joint publisher.

So if you write a book, we'll publish it for you—provided we think it will sell well enough to make us a little dough. And now we're spilling the beans as to the mercenary heart of the whole thing: crass commercialism.

You see, our Reader Service Department has built up a nice little business in selling all kinds of books about oil and gas operations. And the University of Oklahoma Press has a big business publishing all kinds of books. But the OU Press doesn't have very good facilities for promoting its oil and gas books among oil and gas men.

Now you see how the plot begins to thicken. What could be more logical than a tie-up, a sort of a joint-venture operation?

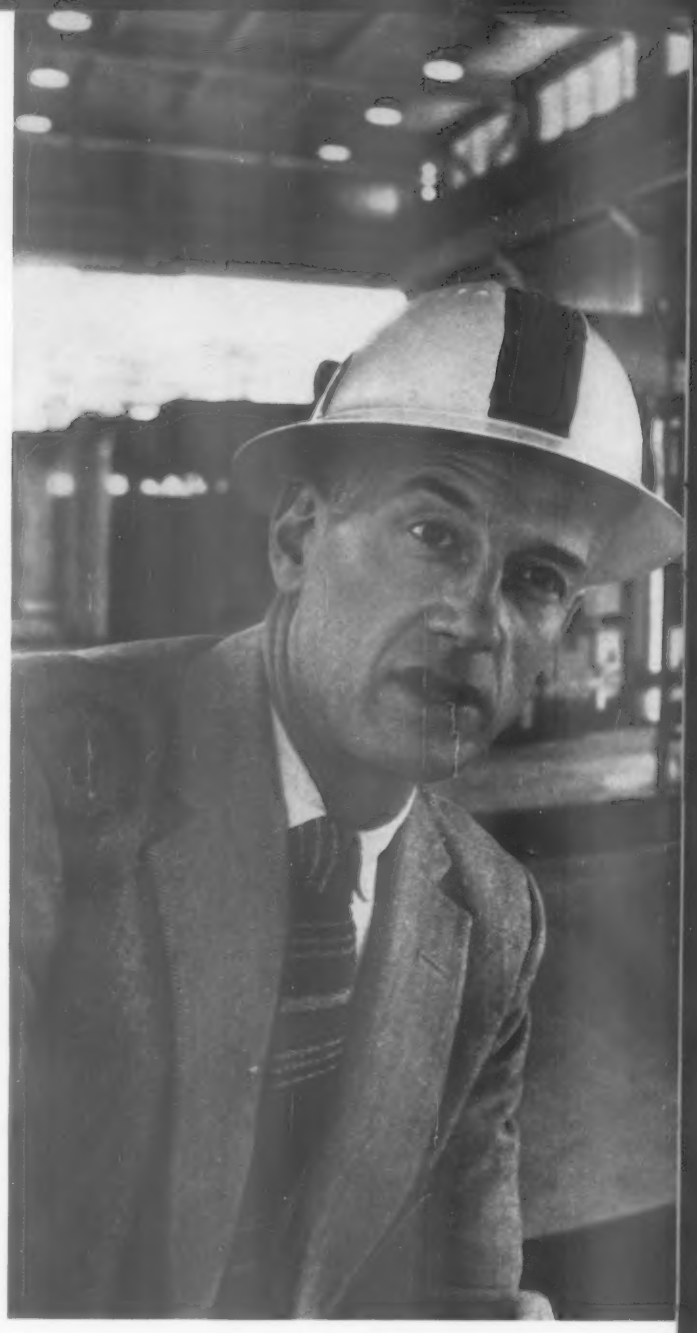
Any more questions?

Oh yes. That Neuner book on the gas industry can be ordered from our Reader Service Department for $5.75.

—*Henry D. Ralph.*

Report from Tidewater...

How Cooper-Bessemer hydrogen boosters supply 800 psi 'round-the-clock



At Tidewater Oil Company's refinery south of Wilmington, Delaware, two Cooper-Bessemer FM-2 compressors play a vital part in the hydrogen treatment process by which the refinery upgrades a number of products and intermediate fractions. These hydrogen boosters operate 24 hours per day, boosting 690 cfm of hydrogen at 470 psi to a discharge of 800 psi. This hydrogen is delivered directly to the desulfurizers.

These Cooper-Bessemer compressors have performed well under this heavy-duty service. Maintenance costs and outage time have been low.

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ENGINES: GAS - DIESEL - GAS-DIESEL
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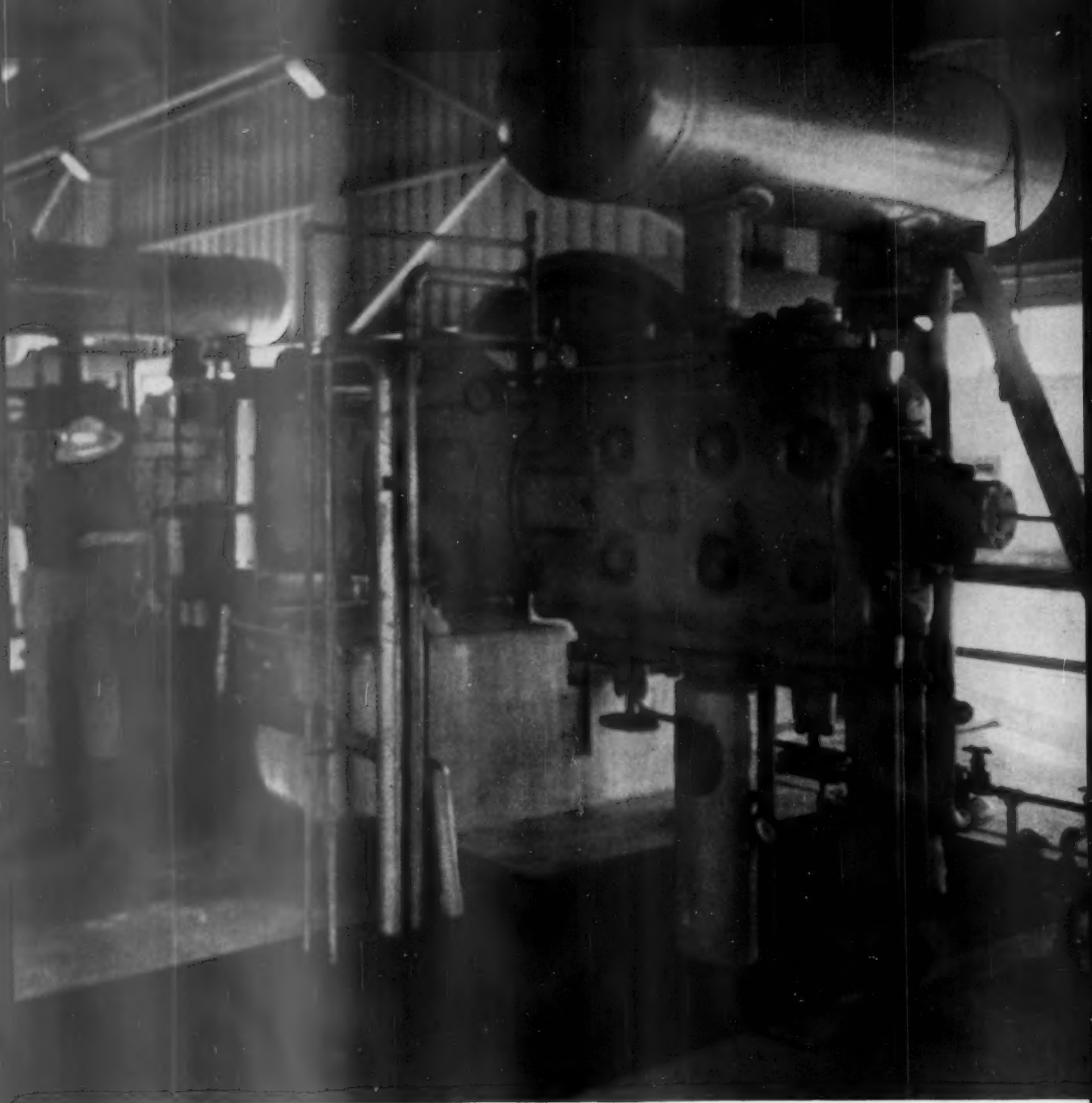
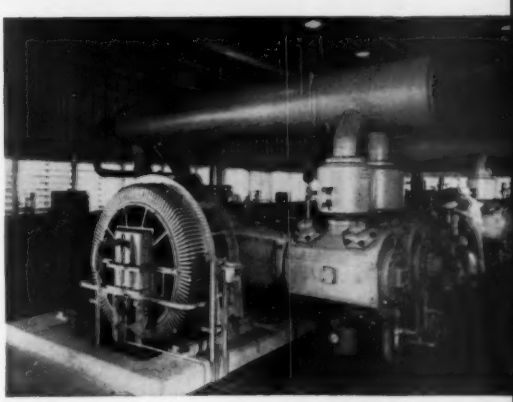
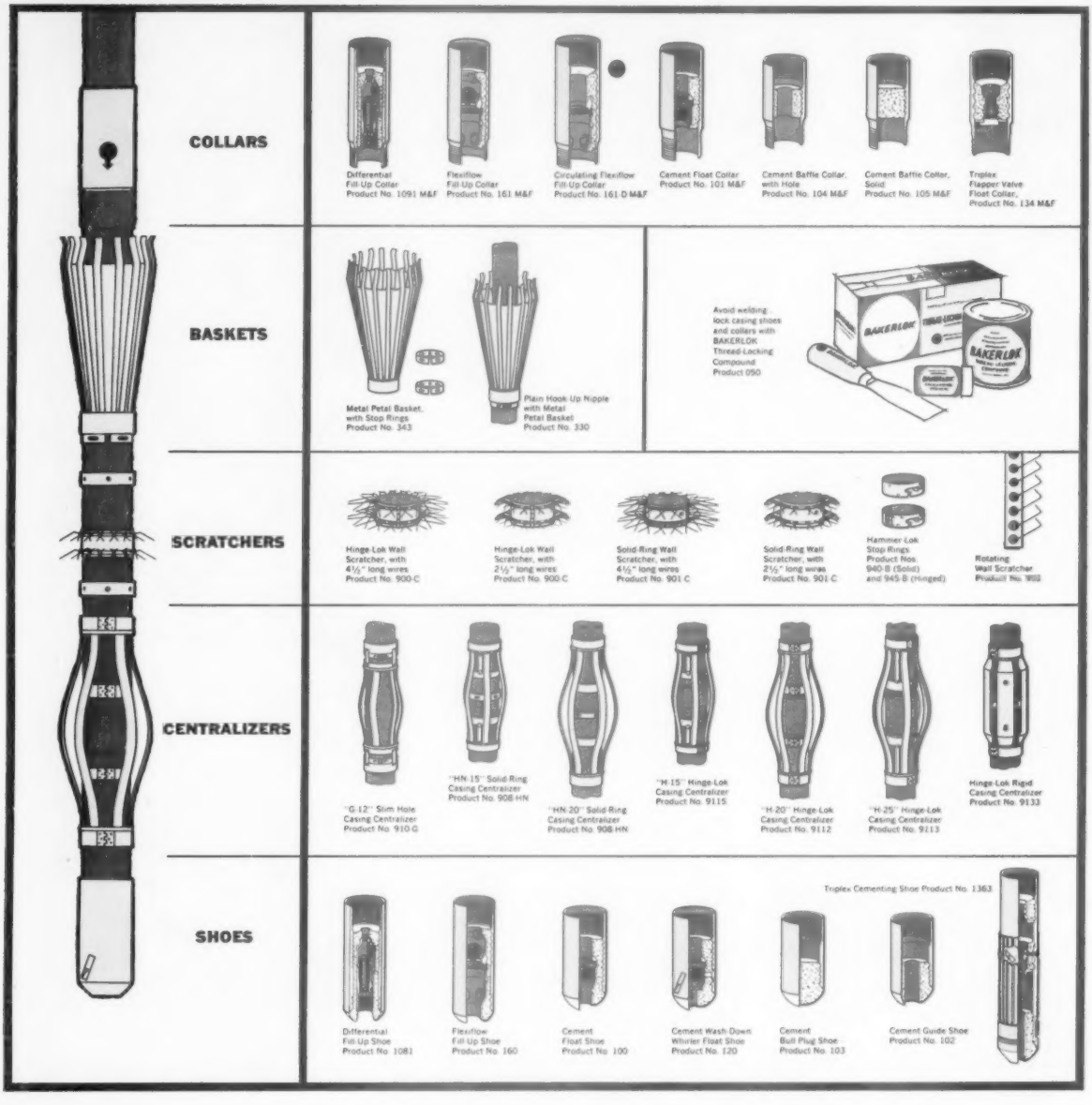


Cooper-Bessemer FM-2 Hydrogen Compressors at Tidewater Refinery. Rated 690 cfm, suction 470 psi, discharge 800 psi.

Three Cooper-Bessemer Air Compressors at Tidewater. They supply utility air at about 120 psi for processes throughout the refinery.




COLLARS
Differential Fill-Up Collar Product No. 1091 M&F
Flexiflow Fill-Up Collar Product No. 161 M&F
Circulating Flexiflow Fill-Up Collar Product No. 161-D M&F
Cement Float Collar Product No. 101 M&F
Cement Baffle Collar, with Hole Product No. 104 M&F
Cement Baffle Collar, Solid Product No. 105 M&F
Triplex Flapper Valve Float Collar, Product No. 134 M&F
BASKETS
Metal Petal Basket, with Stop Rings Product No. 343
Plain Hook-Up Nipple with Metal Petal Basket Product No. 330
Avoid welding... lock casing shoes and collars with BAKERLOK Thread-Locking Compound Product 050
BAKERLOK
SCRATCHERS
Hinge-Lok Wall Scratcher, with 4½" long wires Product No. 900-C
Hinge-Lok Wall Scratcher, with 2½" long wires Product No. 900-C
Solid-Ring Wall Scratcher, with 4½" long wires Product No. 901-C
Solid-Ring Wall Scratcher, with 2½" long wires Product No. 901-C
Hammer-Lok Stop Rings Product Nos. 940-B (Solid) and 945-B (Hinged)
Rotating Wall Scratcher Product No. 900
CENTRALIZERS
"G-12" Slim Hole Casing Centralizer Product No. 910-G
"HN-15" Solid-Ring Casing Centralizer Product No. 908-HN
"HN-20" Solid-Ring Casing Centralizer Product No. 908-HN
"H-15" Hinge-Lok Casing Centralizer Product No. 9115
"H-20" Hinge-Lok Casing Centralizer Product No. 9112
"H-25" Hinge-Lok Casing Centralizer Product No. 9113
Hinge-Lok Rigid Casing Centralizer Product No. 9133
SHOES
Triplex Cementing Shoe Product No. 1363
Differential Fill-Up Shoe Product No. 1081
Flexiflow Fill-Up Shoe Product No. 160
Cement Float Shoe Product No. 100
Cement Wash-Down Whirler Float Shoe Product No. 120
Cement Bull Plug Shoe Product No. 103
Cement Guide Shoe Product No. 102

Good primary cementing equipment makes sense

THERE ARE TWO WAYS to buy primary cementing equipment—by quality and by price. Both are important.

Still, some operators don't shop for quality. They feel that primary cementing is a more or less routine operation. So any shoes, collars, centralizers, scratchers, baskets are good enough.

IN OUR OPINION (and plenty of operators agree), primary cementing is never routine. You've got just one chance to get a good primary cement job. So it makes plain good sense to invest in the most advanced equipment you can get.

Any remedial operation that comes later not only comes at high extra cost—it is never as satisfactory as a primary cement job that's done right in the first place.

THE BEST OF MODERN ENGINEERING is built into Baker Primary Cementing Equipment—yet prices are competitive. Here is equipment you can depend on.

Get Baker Primary Cementing Equipment from your Supply Store. Get help on primary cementing problems from your Baker Serviceman.

BAKER PRIMARY CEMENTING EQUIPMENT

The one complete line available through your **SUPPLY STORE**

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Available worldwide. Sold only through Supply Stores in U.S. and Canada.

Supply Store stocks are backed by stocks in 64 strategically located Baker field warehouses.

A somber present calls for a sober future

TOTTING UP the score on the oil industry during the first half of this year gives a sobering picture.

Things are tough all over. The second half should be a little better, and 1961 should bring further moderate improvement. But while the direction may be up, the speed is likely to be slow.

There is room for optimism, but not of the Pollyanna type. Realism requires that the industry recognize that it is not experiencing a short-range "readjustment" discomfiture but faces a period of lowered sights, close figuring, and cautious planning.

HERE'S THE RECORD of the first half of 1960 compared with the first half of 1959:

Demand was up about 2%. That's on the plus side, but it's a lot less than the industry is accustomed to and a smaller gain than was expected. And gasoline, the high-volume "money crop," was up only 1.8%.

Crude production was down 2% to the lowest first-half average in 5 years. This despite a 3% decline in total imports. There is a definite long-range trend for domestic crude to supply a steadily smaller proportion of total U. S. energy requirements.

The number of drilling rigs in operation was the lowest in years. The number of wells completed was down by some 3,000, and the total for 1960 now looks like about 45,000. In contrast, at the beginning of this year operators planned to drill about 50,000 wells or about the same as the 1958 and 1959 levels. In 1956 there were 58,000 completions.

Refinery runs were down a smidgin, averaging about 85% of capacity. There is still more than 1½ million barrels per day excess refining capacity, and at the anticipated rate of demand growth this won't be wiped out for 3 or 4 years.

Stocks of crude and products, which were excessive at the start of the year, were worked down somewhat but are still too high and should be reduced further by a close rein on refinery runs.

An oversupply on the market caused the softest prices in years. Gasoline prices were down 3%, distillate prices down 15%.

THIS ALL MEANS that for the immediate future oil cannot be considered a glamor-growth industry. Demand will grow, but at a rate that will not absorb present excess capacity and call for much expansion for a couple of years, at the least.

In the meantime the industry must learn to get along on a lower standard of living than it had a few years back—reduced cash flow, low drilling and construction rates, and either curtailed production and refinery runs or continued soft markets.

Oil men like to forget the past and look to the future. But the 1960 record to date calls for a very tempered brand of optimism.

Oil's 1960 Scoreboard

	FIRST HALF	SECOND-HALF OUTLOOK
DRILLING:	21,356 wells completed, 22% of them wildcats; rig activity at lowest point since 1947.	13% gain or 24,095 wells completed; this is still 9.2% under work done in last half of 1959.
PRODUCTION:	7,052,500 bbl. daily—off 2.1% and lowest since 1955.	Significant gains expected to come in the fourth quarter.
REFINING:	8,040,000 bbl. daily with 1.7-million-barrel capacity unused.	Runs should increase—construction will continue low for a year.
DEMAND:	Up 1.9% over 1959, domestic demand up 2.1%.	Up 3.8% in third quarter and 4.6% in fourth, domestic demand up 4.4%.
PIPELINING:	FPC delays crimp construction.	Banner year still expected for gas lines, products building also up, but crude lines off.

Second Half Looks Brighter

...or at least a lighter gray

OIL MEN from here on out in 1960 will find the going a little bit brighter. The economic forecast is more encouraging for the second half than the first which left little to cheer about.

One of the key barometers—total demand—should continue to run strong, giving a firm undertone to industry economics.

The outlook: A 4.4% gain in domestic demand for the last 6 months over the same period last year. Third-quarter total demand should show a 3.8% gain while the final quarter will be up 4.6%.

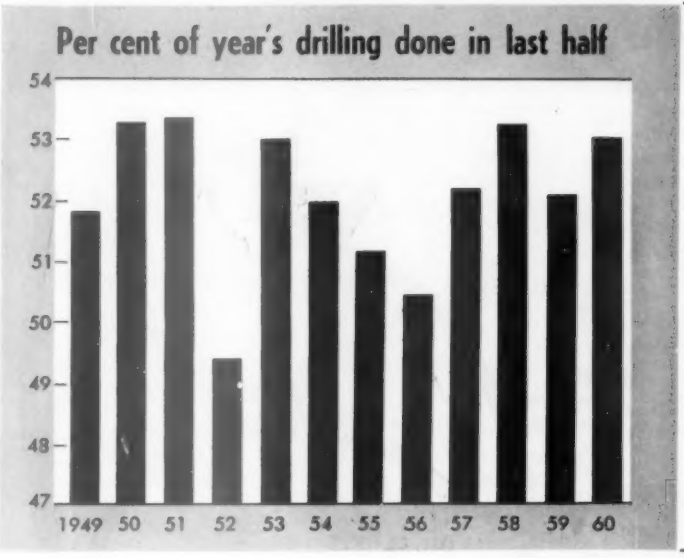
In the wake of firm demand, oil men can expect significant gains in crude-oil production in the last quarter, refinery runs to increase, and drilling to show a 13% gain over the slow first half. Pipelining construction will hit its peak for the year during the period.

Demand picture . . . Total demand in the first quarter set an all-time record but for the half the gain only amounted to 1.9%.

It is expected to improve in the last half along with domestic demand which showed a 2.1% gain in the first part of the year. Part of these gains can be attributed to low demand in the last quarter of 1959.

In products, kerosine has the brightest last-half prospect. Its demand is expected to jump 19.8% in the third quarter and 11.1% in the last. Demand for lubricants will advance 5.1% and 5.2% in the two quarters; LPG 7.3% and 8.5%; and gasoline 2.3% and 4.8%.

The supply side . . . Production of crude oil will show a gain in the last half, partly due to the season



Drilling usually rises

A DRILLING pickup in the second half of the year is a normal occurrence, as chart at left demonstrates.

In the last decade only one year has seen drillers perform less work in the last 6 months than in the first. That was in 1952 when a strike-induced steel shortage interferred. Even then 49.4% of the year's work was done in the last half.

This year the last half will see 53.01% of the 1960 wells drilled, one of the highest rates in the last 10 years. However, if the 24,095 wells planned for the last half materialize, it still will be the smallest volume of drilling since the last half of 1953, when 26,116 wells were drilled.

and partly due to comparison with a poor 1959 last half.

Production in the first half was 7,042,500 bbl. daily, representing a decline of 151,900 bbl. daily from 1959 and the lowest first-half showing since 1955.

Increased production of natural-gas liquids is partly responsible for a cut in crude output. While total demand for all products increased 2.2% in the first half, demand for natural-gas liquids increased 7.6%.

Other explanations for the poor showing of crude: A slight rise in the imports of crude and move by refiners to meet needs from inventories and not to build up stocks.

The refiners and marketers actually imported less petroleum in the first half than in 1959. This was due to peak imports in the first quarter of 1959, especially of products.

Refinery dilemma . . . A bulge of nearly 1.7 million barrels per day excess refining capacity continues to plague domestic processors.

Many refiners succumbed and the resulting excessive products softened prices for the first 6 months. Runs averaged 8,040,000 for the first half which was slightly less than for the same time last year.

The outlook for refinery construction is at low ebb during the last half. This trend will continue for at least another year which means that eventually the excess capacity will shrink as demand moves up.

Field activity . . . Operators won't set any drilling records in the last half, but they do plan to step up activity by 13% over the first-half performance.

Company reports indicate 24,095 wells will be drilled in the last half compared with 21,356 in the first 6 months. This will still be 9.2% less than was drilled for the last half of 1959.

Other drilling highlights: Wildcat percentage was 22.05% in first half and will be 22.76% in the last. Wells were deeper in the first half. Average number of rigs running for first half was 1,919 compared with 2,189 last year and 2,022 the year before.

The explorers, meanwhile, have had only lukewarm success so far in 1960. The Rocky Mountain region still commands more widespread exploratory interest. Other areas of interest include South Louisiana, Mississippi, the Anadarko basin, and southeastern New Mexico.

In the last half, pipelining is expected to be one of the most active segments of the industry. This work will be in sharp contrast to a slow first half marked by agonizing delays in getting projects through the Federal Power Commission.

The construction picture at midyear:

. . . **United States**—13,700 miles of gas lines compared with 13,500 miles last year and 3,300 miles of products lines compared with 1,300 miles in 1959.

. . . **Canada**—900 miles of natural gas compared with 950 in 1959 and 400 miles of products compared with 280 last year.

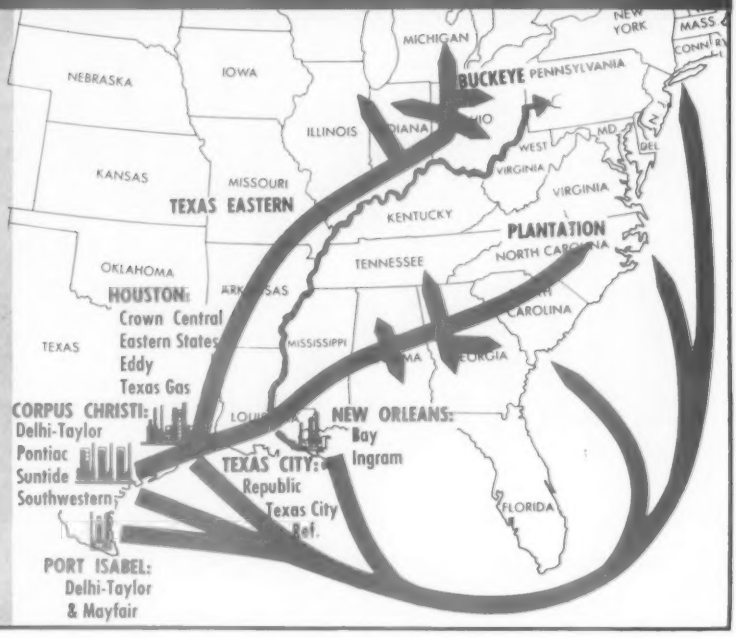
. . . **Foreign**—5,900 miles compared with 6,700 miles in 1959.

(For a complete analysis of oil activity during the first half of 1960, and for the Journal's forecast of what is in store for the second half, turn to the semiannual Midyear Report section, beginning on page 143. This section is perforated for convenience in clipping and filing.)

More Markets Opening to Small Gulf Coast Refiners

With changed circumstances, the Gulf Coast independents had to change also. Instead of selling to the majors almost exclusively, they're now selling to jobbers and distributors through the Southeast, to the Great Lakes, and on the East Coast.

It's a story of adaptation to an entirely new environment.



Coastal Refiners Staging a Comeback

- Independent plants on the Gulf are countering a huge slide in traditional cargo-lot sales with an aggressive push for new and different market outlets. It's been an up-hill battle, but the independents are winning.

Robert J. Enright
District Editor

INDEPENDENT REFINERS on the U. S. Gulf Coast are surviving surprisingly well a great upheaval in their traditional markets and methods of operation.

In the last 5 years most have had to forsake the time-tried market foundation on which they were built—bulk cargo sales of products to major companies—for something else. It was either that or go broke.

Bulk sales of independent coastal refiners to majors have dwindled steadily since the early 1950's. The slide in such sales reached a "crescendo," as one independent puts it, in 1954-56.

Plant runs skidded, and so did profits. Many coastal independents had to jump somewhere. And there weren't many places to light if the majors wouldn't buy.

They could invade the retail-marketing field by building or buying service stations. Or they could build product terminals and compete as wholesalers for business among the numerous and growing independent retail-marketing chains. They could diversify into petrochemicals to help bolster sagging profits.

Some coastal independents have gone one way, some another, some a combination. In most cases, the decline in runs and sales at least has been halted. And some companies have built up new markets so effectively that all lost ground has been regained.

Only a few coastal plants still concentrate solely on bulk sales. And these, for the most part, have captive markets by virtue of either "being wedded to" a major (essentially under lease) or being majority-owned by cooperatives. The one or two exceptions, marketing experts say, have found the bulk-sales game increasingly tough sledding.

What brought it on . . . Up to the 1950's, coastal independents were in effect mostly custom refiners for major companies. Only a very few were selling gasoline to independent marketers or operating their own stations in any big way.

Republic Oil & Refining Co. at Texas City, Tex., was one of the few—distributing through more than 20 terminals in the Southeast.

As a marketing executive for one independent puts it: "All majors up to this time bought huge quantities of gasoline on the spot market. But the majors' easy and growing access to cheap foreign crude changed all this.

"Management began to listen to the urging of manufacturing departments to 'let us run the crude'. The majors' plant capacity on the East Coast—designed to process imported oil—began to climb sharply.

"At the same time, their purchases of bulk gasoline from Gulf Coast independents fell off proportionately."

A glance at how coastal independents are adjusting to a changing market

Eastern States Petroleum & Chemical Corp. (Division of Signal Oil & Gas)—Daily capacity of 63,000 bbl. at Houston refinery. Has gone heavily into the terminaling distribution business in the Southeast—also very heavily into chemicals and specialties. Increasingly smaller part of total sales is bulk.

Southwestern Oil & Refining Co.—Has 33,000-bbl. plant at Corpus Christi. Distributes heating oil in New York City. But gasoline moves entirely in bulk-cargo lots to majors—much of it to Gulf Oil Corp. Has had increasingly difficult time selling bulk gasoline.

Republic Oil & Refining Co.—Daily capacity of about 45,000 bbl. at Texas City. One of the early terminal operators in Southeast. Now has more than 20 terminals there. But still sells some bulk quantities. Quantity decreasing.

Crown Central Petroleum Corp.—Capacity of 40,000 bbl. daily at Houston refinery. Is actually building a market for branded gasoline through terminal facilities up and down the Atlantic seaboard.

Ingram Oil & Refining Co.—Capacity at Meraux, La., refinery is about 20,000 bbl. daily. Is heavily in the terminal distribution business, now seldom has product available for bulk sales.

Pontiac Refining Corp.—Has 45,000-bbl. plant at Corpus. Has grown increasingly close to Gulf under processing arrangements. Company buys Gulf crude and sells the products back. Essentially no outside market.

Bay Petroleum Corp.—Now a division of Tennessee Gas Transmission Co. Operates 25,000-bbl. a day plant at Chalmette, La. Concentrating heavily on terminal distribution, with very little material available for bulk sales. Has contracted with Hartol, a big marketing outlet in the East. No product available for bulk sales.

Texas City Refining, Inc.—35,000-bbl. a day plant at Texas City. Most of output goes to farm cooperative owners in the East.

Suntide Refining Co.—Has capacity of 65,000 bbl. daily at Corpus plant. Elected to go 100% bulk route when entered market in 1954. Big added volume had depressing effect on Gulf Coast cargo-lot market. Recent management change has improved situation. New outlets are now available to a major oil company.

Delhi-Taylor Oil Corp.—Combined capacity of 55,000 bbl. daily at plants at Corpus and Port Isabel. Going very heavily into terminaling in the Southeast and East and into petrochemicals, with diminishing volume available for bulk sales.

"This shoe began to pinch the independent in 1955. But the Suez crisis eased the situation. Suez also, however, distorted and clouded our picture of what was happening to us. By 1957, with world markets back to normal and with bulk sales still plummeting, it became quite clear to many of us that we had to do something or fold up."

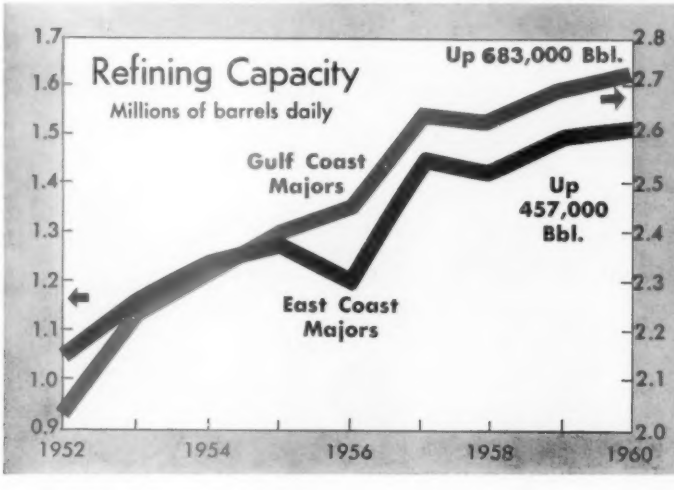
Southeastern invasion . . . That "something" for many was to invade the Southeast — Florida, the Carolinas, Georgia, Tennessee, and other states—and the Deep South either with service stations or terminaling operations or both.

Why the Southeast?

Gulf Coast independents obviously could not, because of transportation costs, compete with their inland counterparts on the latter's home grounds. They had to set up shop where there was a good gasoline market, easily accessible, and no local refineries. The southeastern U. S. met all these qualifications.

Independent retailing chains are numerous and thriving in this area. They offer an attractive market target. Gulf Coast products can reach the Southeast relatively cheaply by barge or tanker around the coast or via the Plantation products pipeline. There are only one or two very small refineries in the area.

With such beckoning, Gulf Coast



Problems for Independents:

Their major-company "customers" have jumped their own Gulf and East Coast refining capacity by more than 1,000,000 bbl. daily since 1952.

As a result, the independents have been forced to find entirely new markets for their products.

refiners are moving in on the region with more and more product-distribution terminals.

Florida is especially attractive. There independent gasoline retailers have cornered roughly 20% of the total market for motor gasoline. This is far above the national average.

The independent gasoline retailer—such as Billups, Hudson, etc.—has become the prime target for many coastal refiners in their efforts to build gallonage.

The latter have duly noted the growing impact of the aggressive independents. And they are working hard to take advantage of the fact that, though majors love to sell to such retailers, it isn't exactly compatible with the majors' own branded retailing operations.

The coastal refiners also are pounding away hard in their sales arguments on the premise that a major-company source of supply "isn't reliable"—that majors are erratic in their dealings with independent marketers and may cut them off suddenly for one reason or another. This has been especially effective with the larger chains which must have an assured steady supply of products and can't live on a day-to-day basis.

Growing terminal sales to the chains in the Southeast testify to the success of this campaign. Coastal refiners are garnering a good share of the increased volume of business done by the chains. And they have taken away from the majors some of their share.

Blow cushioned . . . Fortunately, coastal refiners, while suffering greatly from the loss of cargo sales in the mid-fifties, have benefited from other industry developments which worked in their favor.

The most important of these was the mandatory import program. The independent plants were all given crude-import quotas, based on their 1957 runs. The quotas are worth roughly $1 a barrel to the Gulf Coast refiners. They can be sold to major companies, traded for products or domestic crude, or processed for the quota holder's account.

For example, Sunray Mid-Continent Oil Co.'s crude quota can be processed by Suntide. Suntide's own quota, plus the Sunray Mid-Continent quota, was a great help to Suntide.

A second beneficial development since 1955 was the conversion by Texas Eastern Transmission Corp. of the Little Inch Pipe Line from gas to products service.

The Little Inch has a complete gathering system in the Houston-Port Arthur-Beaumont area and is connected to the Bayou Pipe Line with connections to the Plantation Pipe Line at Baton Rouge. Thus, markets in the Southeast and mid-Atlantic states became accessible entirely by pipeline to coastal independents.

Also, through the Little Inch, products can be shipped to Chicago to compete with the Great Lakes Pipe Line from Group 3—as was the case last winter. Texas Eastern's recently announced tie-in with Buckeye Pipe Line Co.'s products system serving Indiana, Ohio and Michigan further extends the Gulf Coast independent's potential market (OGJ, July 18, p. 64).

This over-all system of products lines to the North and East presents Gulf Coast refiners a big opportunity for product exchange deals.

Little Inch markets are not always attractive to coastal independents. But the facility is there and becomes a real godsend in periods of extreme weather or in other emergency-demand periods.

The same is true of markets up the Mississippi River. Gulf Coast refiners suffered from the loss of their East Coast residual business to imported quota residual fuels. Their recourse was to go to coking or to processing

Delhi-Taylor . . .

One independent that is

DELHI-TAYLOR Oil Corp., operator of two refineries on the Texas Gulf Coast, provides a vivid, clear-cut example of change brought by the marketing revolution still going on in independent coastal refining.

Prior to 1957, Delhi was a typical custom refiner. Its business was entirely of the bulk variety. Profit came from selling cargo-lot gasoline to major buyers, with minor income from chemicals, specialties, ships' bunkers.

The company owns plants at Corpus Christi and Port Isabel, Tex., with capacity totaling 55,000 bbl. daily.

Delhi's bulk sales began to slide in the early fifties and to tail off badly in 1955. And the decline reached alarming proportions during 1956. Delhi management, recognizing a trend not likely to change direction in the foreseeable future, started an active search for an antidote.

It didn't have time to go the route many regard as safest—building its own service stations and thus assuring a steady market for at least part of its plant output. It takes time to acquire good sites and build stations, and still more to build gallonage.

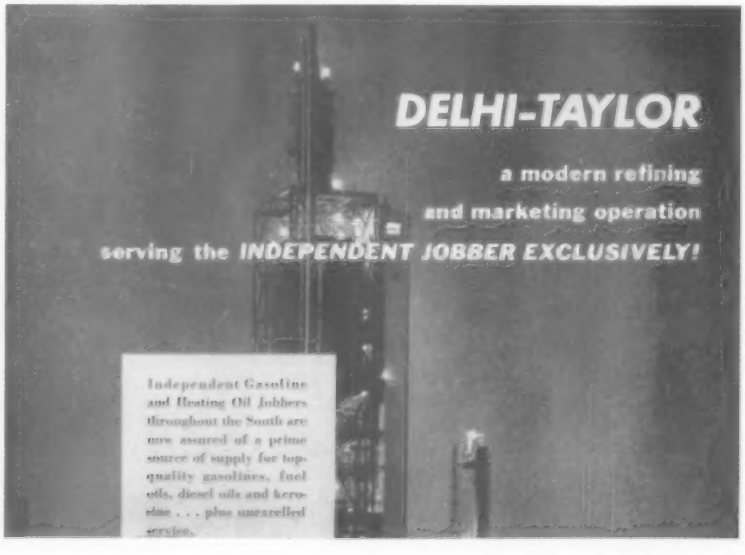
Besides, Delhi management frowned on this route as being incompatible with selling products to other retailers.

Chasing the chains . . . The company decided to concentrate its drive for new markets solely on the independent retailer.

This approach, it felt, would be easier, less expensive, less time-consuming. Delhi decided it also held more promise and involved less dislocation, even if it was more risky.

The decision to build its first product-distribution terminals and

INDEPENDENTS ONLY can buy, says Delhi-Taylor in this brochure.


DELHI-TAYLOR
a modern refining
and marketing operation
serving the INDEPENDENT JOBBER EXCLUSIVELY!
Independent Gasoline and Heating Oil Jobbers throughout the South are now assured of a prime source of supply for top-quality gasolines, fuel oils, diesel oils and kerosine . . . plus unexcelled service.

crudes to produce under 0.6% sulfur No. 6 for barge movement up the Mississippi and Ohio rivers to the steel mills.

While the Gulf Coast independents have staged a comeback, they are still not back to a level of operations comparable with the majors.

Crude runs to stills in May averaged 77.2% of capacity compared with 92.7% for major oil-company refineries in the Gulf Coast. Independents ranged from 68.5 to 109.1% in individual plants, while majors varied from 68% to 119%.

REFINERY at Corpus Christi is one of two operated by Delhi-Taylor.

surviving change

compete in Florida as a wholesaler followed quickly.

As with other coastal refiners, the Suez crisis eased Delhi's pinch in late 1956. But the bulk sales depression came back even stronger in 1957.

By January of 1957, however, the company opened the first of three terminals in Florida. Its campaign among the independent retailers had already made progress.

Building a sales force from scratch, Delhi began to sell hard in 1956. Its theme: "We market top-grade refined products **only through independent jobbers.** We do not compete with our customers!"

Terminal sales rocket . . . With this pitch, Delhi snared a big Billups Eastern account and got off to a running start.

And in 1957, its terminal operations accounted for 14% of total product sales.

Expanding into other southeastern states, the company hiked this percentage to 41% of total sales in 1958 and to 45% in 1959.

This year, according to R. L. Berry, Delhi general sales manager in Dallas, the company expects to sell about 40,000 bbl. of products a day. Of this volume, he expects about 25,000 bbl. daily, or more than 62%, will be sold through Delhi terminals in the Southeast.

This is a phenomenal change of pace. In just 4 years, Delhi's market has switched from 100% sales in the general bulk category to more than 60% sales through terminals.

This is fast, Berry agrees, but it had to be fast. "Every coastal independent has found it increasingly difficult to move bulk cargo lots in the past 4 years. But some, by their prior relationships, have been able to hold on. Our company had to change practically overnight to survive."

Delhi's terminaling success has helped kick its total products sales to the highest level in history. Last year, dollar volume from products sales other than petrochemicals had climbed to roughly $58,000,000—from about $42,000,000 in 1955, before the worst the first man in Delhi's present mar- of the drop in bulk sales was felt.

Further expansion . . . Berry, actually keting department, joined the company in April 1956, replacing a retiring sales manager who had handled the company's bulk cargo sales.

The department now has expanded to 17. This includes executives and salesmen only—not clerical and accounting personnel.

And the terminaling operation has ballooned from the original three terminals in Florida to 18 of various types and sizes in Florida, Georgia, North and South Carolina, Tennessee, Alabama, and Virginia.

Late this year, the company will open four more large new terminals in New York State in the Syracuse-Rochester-Utica area. These, like the others, will sell to the same folk—the independent retailers of gasoline and heating oils.

In brief, Delhi has found its wholesaling operation to independents more successful than it had dared hope. Though still quite willing to sell cargo lot, it does not foresee ever returning to its former complete dependence on this kind of business.

As Berry puts it:

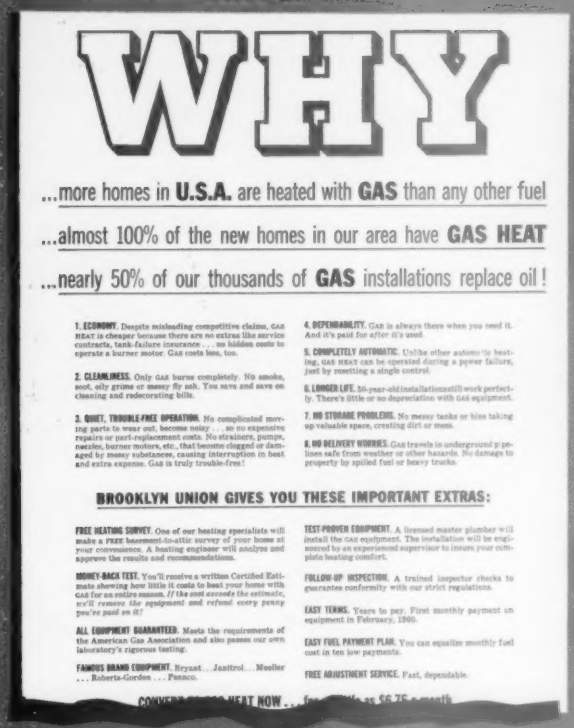
"The independent or unbranded service-station operator who is our customer has enjoyed a rate of growth in the past 5 years, particularly in the Southeast, that has been fabulous. And we have aligned ourselves with him, selling him competitive merchandise at competitive prices.

"We feel his spectacular, low-cost, price-oriented merchandising has a definite appeal to certain segments of the motoring public, as opposed to high-cost conventional major-company branding. And we feel he will continue to have a significant and probably growing share of the retail gasoline market."

Diversifying adds profit . . . Along with its new terminaling operations, Delhi-Taylor has been pushing hard and successfully to diversify into the petrochemicals and specialties business.

It is manufacturing a wide range of solvents. And it claims to have become already one of the three largest producers of aromatics in the country. It is a large volume producer of benzene, for instance. And just last month it started production at its Corpus plant of orthoxylene. Its total production of that chemical has already been sold under long-term contract.

Sales of petrochemicals have grown from zero in 1956 to nearly $15,000,000 in 1959, with prospects for further sharp gains this year.


WHY
...more homes in U.S.A. are heated with GAS than any other fuel
...almost 100% of the new homes in our area have GAS HEAT
...nearly 50% of our thousands of GAS installations replace oil!
1. ECONOMY. Despite misleading competitive claims, GAS HEAT is cheaper because there are no extras like service contracts, tank-failure insurance . . . no hidden costs to operate a burner motor. GAS costs less, too.
2. CLEANLINESS. Only GAS burns completely. No smoke, soot, oily grime or messy fly ash. You save and save on cleaning and redecorating bills.
3. QUIET, TROUBLE-FREE OPERATION. No complicated moving parts to wear out, become noisy . . . so no expensive repairs or part-replacement costs. No strainers, pumps, nozzles, burner motors, etc., that become clogged or damaged by messy substances, causing interruption in heat and extra expense. GAS is truly trouble-free!
4. DEPENDABILITY. GAS is always there when you need it. And it's paid for after it's used.
5. COMPLETELY AUTOMATIC. Unlike other automatic heating, GAS HEAT can be operated during a power failure, just by resetting a single control.
6. LONGER LIFE. 30-year-old installations still work perfectly. There's little or no depreciation with GAS equipment.
7. NO STORAGE PROBLEMS. No messy tanks or bins taking up valuable space, creating dirt or mess.
8. NO DELIVERY WORRIES. GAS travels in underground pipelines safe from weather or other hazards. No damage to property by spilled fuel or heavy trucks.
BROOKLYN UNION GIVES YOU THESE IMPORTANT EXTRAS:
FREE HEATING SURVEY. One of our heating specialists will make a FREE basement-to-attic survey of your home at your convenience. A heating engineer will analyze and approve the results and recommendations.
MONEY-BACK TEST. You'll receive a written Certified Estimate showing how little it costs to heat your home with GAS for an entire season. If the cost exceeds the estimate, we'll remove the equipment and refund every penny you've paid on it!
ALL EQUIPMENT GUARANTEED. Meets the requirements of the American Gas Association and also passes our own laboratory's rigorous testing.
FAMOUS BRAND EQUIPMENT. Bryant . . . Janitrol . . . Mueller . . . Roberts-Gordon . . . Fonco.
TEST-PROVEN EQUIPMENT. A licensed master plumber will install the GAS equipment. The installation will be engineered by an experienced supervisor to insure your complete heating comfort.
FOLLOW-UP INSPECTION. A trained inspector checks to guarantee conformity with our strict regulations.
EASY TERMS. Years to pay. First monthly payment on equipment in February, 1960.
EASY FUEL PAYMENT PLAN. You can equalize monthly fuel cost in ten low payments.
FREE ADJUSTMENT SERVICE. Fast, dependable.

Every day...more Long Island families demand OIL HEAT!
Mr. J. B. of Garden City, L. I.*, used to use gas heat . . . says he never got enough heat or hot water. Now that he's switched to oil, his troubles are over.
GAS NO LAUGHING MATTER!
"People kid me about my sense of humor, but I didn't see anything funny in big gas heating bills! And the quality of our gas heat seemed to leave a lot to be desired. Our house isn't big, yet we never got enough heat in our northwest bedroom. The hot water situation was rough, too. There just never was enough of it whenever we needed it most . . . for showers, baths and all our washing needs.
"But now that we've switched to oil, those problems are over for good! We're enjoying better heat—and far less expensive heat (and hot water)—than ever before. Take my advice—switch! We're delighted we now heat with oil!"
FIGURE IT OUT YOURSELF: SAVINGS UP TO 38%!
COMPARE THESE COSTS** | OIL | GAS
$224 | $364
$305 | $460
THE TRUTH IS . . . You pay much less to heat better with OIL
CAUTION: TO NEW HOME BUYERS
Not all new homes on Long Island are equipped with Oil Heat. Some builders offer inexpensive heating and hot water systems that burn expensive fuels—cost you dearly once you burn them on! Oil Heat is your sure sign a builder cares what happens to you AFTER you buy his house. So INSIST on Oil Heat—hallmark of new home quality—everywhere you look!
OIL HEAT INSTITUTE OF LONG ISLAND

The gas cry: Everybody's doing it ***Oil's answer: Save your money!***

Fuel-Oil Men Are Now Fighting Back

• More promotion, better burners, and a better product are the instruments oil men are using in a determined effort to get back markets lost to gas.

John P. O'Donnell
District Editor

FUEL - OIL marketers wish now they had started 10 years ago to do what they are doing today. They are embarked on a program that shows signs of getting back business lost to gas in some areas, holding oil's share in others, and slowing the progress of gas in the rest.

This program embodies three principal points:

. . . Aggressive promotion. Heating-oil marketers will spend $3,000,000 this year in cooperative advertising. This is half again as much as they spent in 1959 and more than 3½ times what they spent in 1958.

. . . Better equipment. Both oil companies and burner manufacturers are working on new, more-efficient, and less-costly burners. A $500,000 research program has been recommended to the API.

. . . Improved quality. Much of the No. 2 heating oil being sold today is being hydrotreated and more will be. Stability-improving additives are in common use and ASTM specs are being rewritten to set higher standards.

It's a broad, hard-hitting program. Some good results are already apparent, but heating oil is far from out of the woods. It has an active, aggressive competitor in natural gas. And electricity is trying to increase its presently minute share of the home-heating market.

Big market . . . One measure of the success of natural gas is the number of homes it is now heating.

There are a third more using gas than there are fuel oil. This does not mean, however, that more gas is being used in residential heating. On a B.t.u. basis, oil still outsells gas by a comfortable margin.

A good quarter of the gas furnaces are in homes in the South Central and Rocky Mountain states. Except for states like Idaho, Montana, and Wyoming, average home fuel consumption is pretty low in such states.

The market these fuels are fighting for is far more than peanuts. Demand for distillate fuels represents almost 20% of the demand for all oil products in the U. S. Less than a third of this volume goes into diesel fuel. The rest ends up in an oil burner. And 3 out of 5 of those barrels are consumed in private homes.

This business is important to more than just the heating-oil marketers. One economist observed that "when oil loses much of the growth of this market to gas, the impact is substantial. Allowable schedules, crude - oil production rates, refinery rates, pipeline movements, and tanker shipments are all affected."

Every barrel of heating oil displaced by gas means one less barrel

of crude oil needs to be produced, transported, and refined.

Statistics show the trend: Since 1956, domestic demand for all fuel oils has increased by less than 1% per year while the demand for gas has risen by 5½% a year. Had fuel-oil demand increased at the rate enjoyed by gas, producers would have had a market for a half million barrels per day more of oil.

Area of success . . . Heating oil is having its greatest success in combatting gas in the Northeast.

Northeastern and midwestern states together represent the most important home-heating market. More than 80% of all residential oil-heating units are located in this area and more than 90% of all No. 2 fuel consumed in the U. S. is used there.

Heating oil has one big advantage in the Northeast that it is now pressing to the fullest. This is its lower cost to the consumer. Fuel-oil dealers in many metropolitan markets in the Middle Atlantic and New England states are bombarding home owners with facts on costs . . . and it is paying off.

Oil Heat Institute of Long Island hired a fuels and combustion consultant early this year to compare costs of heating with fuel oil and gas. He compared published gas rates with No. 2 fuel oil priced from 13 to 16 cents per gallon. He found that, for an average home, one that would use 1,500 gal. of No. 2 or 208 M.c.f. or gas, gas would cost 80.4% more than fuel oil at 13 cents per gallon and 46.8% more than fuel oil at 16 cents per gallon.

Hartford County, Connecticut, has an Oil Heat Association which compared oil with gas and electricity. It found that an average home would pay from $210 to $240 for fuel oil, $294 to $336 for gas, and $461 to $865 for electricity.

New York City's Better Heat With Oil Council, Inc., compared fuel-oil prices with Brooklyn Union Gas Co. and Consolidated Edison rates. It reported that "in the Brooklyn Union area, oil heat is 30% cheaper; and in the area served by Consolidated Edison, oil heat is 37% cheaper than gas."

Oil Heat Institute of Rochester, N. Y., compares oil and gas-heating costs graphically. It concludes that the average home owner would pay 31% more for gas than for oil and offers this telling comment:

"The owner may earn about $2.50 an hour and net $1.67 after taxes. This means that he must work nearly 7 hours at his job just to pay the extra cost of gas (in a cold winter month). Over the whole year this unhappy man must work more than one full week at his job to pay the additional cost of gas. Give me OIL and an EXTRA WEEK OFF WITH PAY."

In stressing oil's price advantage where it exists, fuel-oil marketers are literally "fighting fire with fire." Lower cost, better efficiency, less dirt, greater reliability, etc., are among the sales arguments used repeatedly by gas companies.

Fighting back . . . Brooklyn Union is among the most aggressive of the gas advertisers, and it minces no words in directing its attack at oil.

Its ads claim, "Tests show gas units more efficient than oil;" "Nearly 50% of our thousands of gas installations replace oil," etc.

Early this year when a number of metropolitan New York fuel-oil dealers were charged with shortchanging customers, Brooklyn Union put out a flyer: "Customers Getting Bad Taste from New 'Invisible' Type Fuel Oil . . . It Burns Up . . . But Won't Burn in the Furnace."

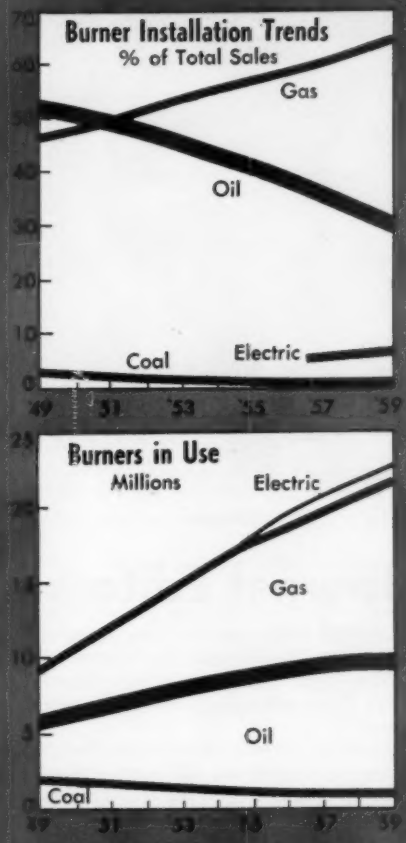
Promotion is the major objective of the National Fuel Oil Council which replaced Oil Heating Market Reports last year. Under its aegis, about $3,000,000 will be spent this year on cooperative advertising, up 50% from 1959. In the first year of OHMR, 1955, the total was a mere $356,900.

Under the council's method of operation, funds raised by local organizations are matched by the 13 refiner members. They are Atlantic, California Oil, Cities Service, Delhi-Taylor, Esso, Gulf, Mobil, Phillips, Shell, Sinclair, Standard of Indiana, Sun, and Tidewater. The refiners contribute on the basis of a half cent per barrel on sales of kerosine, No. 1 and No. 2 fuel oil.

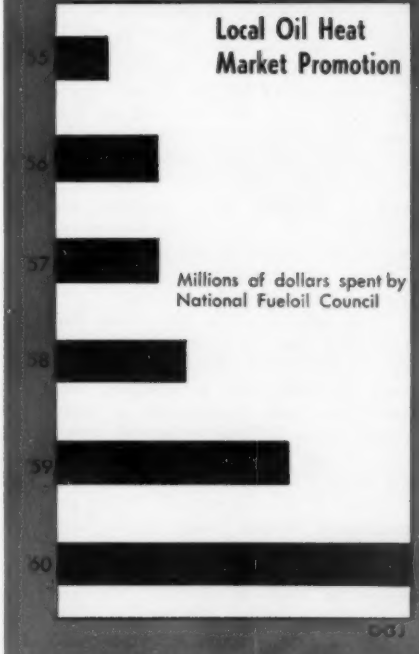
The council operates in a 22-state area with five regions: Midwest, New England, North Atlantic, Central Atlantic, and South Atlantic. At last report there were 70 organized local markets ranging in physical size from state organizations like New Jersey, Florida, and Wisconsin, to small towns as Keene, N. H.; Rock Hill, S. C.; and St. Clair Shores, Mich.

Expenditures, between local funds and refiner contributions, will range from a low of less than $2,000 per year per market to a

The problem . . .



. . . and the effort



Kinney

O'Donnell

Journal Editors in New Posts

GENE T. Kinney, assistant pipeline editor of The Oil and Gas Journal in Tulsa since 1956, has been named East Coast editor in New York, a new position.

John P. O'Donnell, formerly district editor in New York, will succeed Kinney as assistant pipeline editor in Tulsa. The appointments are effective August 1.

Kinney was staff writer in the Oklahoma City bureau of the Associated Press before joining the Journal in 1955 as district editor in Tulsa. He is a 1949 graduate of the University of Oklahoma.

O'Donnell was with the Oil City, Pa., Derrick before joining the Journal's New York office in 1940. He later served as advertising manager and sales manager of the Borden Co.'s export division, deputy director of American Petroleum Institute's Oil Industry Information Committee, and executive secretary of the transportation and international trade sections of the New York Board of Trade. He rejoined the Journal in 1956.

high of around $400,000. The top figure will be spent in Boston.

Applications from the 70 participating markets for the first half of this year total $740,440.08. With matching contributions from refiners, the 6-month total will reach $1,480,000. Ten or a dozen more markets are expected to be added at the next meeting of the council so that it is certain that the total expenditures will match the projected $3,000,000 total.

This sum is a far cry from the $356,900 spent as recently as 5 years ago. It still represents what some refiner members term a "minimal" expenditure since it amounts to only about 0.1% of the estimated retail sales. There is some sentiment within the council to boost this figure.

Much of the support for higher expenditures comes from those who point to vastly greater spending on gas. Unofficial estimates of gas advertising range as high as $30,000,000 per year. This includes such effective devices as participation in a national network TV show, special sections in such papers as the New York Times, and an allocation of $5,000,000 for participation in the coming New York World's Fair.

The strategy . . . More aggressive promotion, based principally on more advertising, is the No. 1 tool of the oil marketers. But there are others. One on which some real money is scheduled to be spent is more efficient burners.

Major single project is the research program that will be carried on as a result of the Battelle Memorial Institute recommendation if the API approves. Battelle was hired a year ago by the Fuel Oil Committee of the API's Marketing Committee to determine which direction this research should take.

It came up with 49 different projects and recommended expenditures the first year of $900,000 and the second year, $1,200,000. The Fuel Oil Committee has recommended that API underwrite the first year at a cost of $500,000. If approved at this fall's budget meetings of the API the program would begin next year.

Research on oil burners now runs about $500,000 per year with most being spent by oil companies. However there is a group of 14 fuel-oil distributors that has formed Operation Oil Heat Associates and is spending $100,000 in an attempt to develop a radically new and improved burner.

At least four oil companies have done work on new burners: Esso, Gulf, Shell, and Socony. Esso has developed a new high-efficiency burner for the carriage trade. Socony has come up with a Micro Test Burner with a 1½ by 9-in. combustion chamber. Shell is making its Ventres burner, a tiny unit giving 25% more useful heat, available to burner manufacturers. It will burn oil at rates as low as a tenth of a gallon per hour. Gulf is working on a radical principle that would eliminate the combustion chamber, fuel pump, and combustion head.

Equipment manufacturers are also working on this problem. American Thermocatalytic has developed the Pyracore burner which burns like a gas mantle without visible flame; Jet-Heet's forced-air system which delivers 25% of the usual amount of air but four times hotter than usual; Hart Heat's burner which mixes air and atomized oil with reduced pulsation and greater efficiency, and the Waller burner which is about the size of a suitcase.

Perfection of such equipment will cut the use of oil per unit but, oil people feel, will give them a much better competitive tool to battle natural gas. One of gas' major advantages is its low installation cost. Gas units can be installed at $150 to $200 per unit less than oil units.

This difference appeals strongly to home builders, particularly development and speculative builders. Their interest is understandably greater in low initial cost than in operating costs that come to light after the house has been sold.

Cooperation . . . Some fuel-oil marketers feel that they should make a more determined bid for such business.

They propose offsetting the higher initial cost of oil by offering to help builders sell the houses through advertising or other promotion. They agree that the most effective means is to develop an oil burner that will come nearer to the cost of a gas burner. They don't hope to equal the cost but believe that a difference of $35 to $50, which they believe is in

the ball park, would help swing the balance in their favor.

Heating-oil manufacturers are also making a contribution by upgrading the quality of their product. A considerable portion of the No. 2 oil now being sold has been hydrotreated. Some estimates run as high as 50%.

Strange quirks . . . Some things dismay the fuel-oil marketers.

One is the fact that oil companies push LPG sales on the basis that homes equipped to handle LPG will be ready for natural gas when it comes. But, as a result of fighting the competition harder in the marketplace and improving the quality and usefulness of their product, fuel-oil marketers are looking to the future with more confidence than they did in the recent past.

There are some concrete reasons for this:

In many of the markets where distributors have organized under the banner of the National Fuel Oil Council they are having more success in getting new home installations and have cut their losses to gas.

Marketers who, a few years ago, were resigned to a declining market now envision steady gains through the sixties. Some see the gains as low as 2% per year, others look hopefully to 4 to 5% per year gains. A factor persuading the more conservative is the prospect of lower consumption per more efficient unit.

Mobil Abandons Deep Wildcat in Florida Panhandle

ANOTHER effort to find oil in Florida has fallen flat.

Mobil Oil Co. has abandoned a deep test in the Florida panhandle's Santa Rosa County (OGJ, June 20, p. 55).

The operators quit at 12,517 ft. after getting no shows. They do not plan another well in the area until at least next year—if then.

The well was considered significant because it was to test the Hosston formation at the base of the Lower Cretaceous section, which is productive in South Mississippi. Other wildcats in the area had drilled only to the top of the Lower Cretaceous.

Mobil had put together 100,000 acres in the panhandle counties and westward into Alabama's Baldwin County. The well was 10 miles south of the Alabama border in a timbered area owned by St. Regis Paper Co. It had behind it 2 years of geophysical and geological study.

watching WASHINGTON

Clyde La Motte

• Kennedy and Johnson will have their big inning . . .

WATCH FOR quick developments when Congress gets back to work after the political conventions. The Senate returns August 8; the House reconvenes August 15.

The pressure will be on for quick, decisive action. The new Democratic team of Kennedy and Johnson will want to show in advance of the November election that it can get results. This will be its golden opportunity.

There will be heavy pressure on all Democrats in Congress to display party unity. Thus the split which has often neutralized the party's majority in Congress will be patched up—at least for the time being.

Apparent strategy is to select a few pieces of major legislation, act on them promptly, then adjourn. Efforts will be made to avoid controversial issues, particularly the "minor" ones that would affect only a small segment of the voting public.

There will be little direct oil legislation. Amendment to federal leasing laws probably will be passed. So will changes in the Helium Act. But antidepletion foes will be urged by party leaders to postpone their move to cut percentage depletion—for the sake of party harmony and because antidepletion foes have little chance of mustering enough votes anyhow.

• Election aside, oil is already entering a new era . . .

REGARDLESS of the outcome of the November election, big changes, big challenges, big adjustments lie ahead. This will be true for oil as much as for anything else—perhaps even more so.

There is still a general public conception that the oil industry is fat and prosperous. Legislators usually think of it first when more tax revenue is needed. Landowners and others almost automatically jack up their prices when they know an oil company is the buyer. Labor unions raise their wage targets when oil activity is involved, and stress the theme that the oil companies certainly can afford to pay. And so it goes all along the line, at home and abroad.

It is true that in many instances in the past the oil industry has done little to change this conception. With the emphasis on growth, improvement, and more production through the years, the industry frequently simply shrugged its shoulders and accepted the gouging. Sometimes it seemed even to encourage it, perhaps enjoying playing the role of Santa Claus.

But it is becoming increasingly obvious that the industry, particularly in its domestic operations, can no longer afford to be the big-hearted host grabbing up all the dinner tabs.

With surpluses at home and with increasing quantities of cheap oil abroad, it is clear that a great deal of belt-tightening is in order. Nor can this be considered a temporary move, for there is nothing on the horizon to indicate any return to a free-wheeling heydey era.

In their own operations, most companies are already in the midst of a drive emphasizing economy, operational cost-cutting and competitive vigor. This has been evident, too, in company reorganizations, personnel changes and work force reductions.

• Congress and public need to get the word, too . . .

ECONOMY and efficiency within the oil industry aren't all that is needed, however. Equally important is the necessity for awakening the general public to the changing conditions the oil industry faces.

Oil has entered a new and different era. It is necessary that everyone in the industry be keenly aware of that, for the trend will increase in the years ahead, rather than return to the ways of "the good old days."

Congress and the public need to know this, too.

Change Is Coming; Will Oil Be Ready?

Clyde La Motte
Washington Editor

OIL MAY have more at stake in the coming election than in any since 1952.

For the first time in years, there may be clear-cut differences in party lines, platforms, and party directions. This is worth watching because sharp party trends can be even more important than individual candidates.

Note the swing of the Democrats away from the party's more conservative approach of the past few years. New leaders are at the helm and they are flexing their muscles. For proof, look at the new Democratic platform.

It is true that party platforms are designed primarily to get votes, and not necessarily to serve as a blueprint for an upcoming administration. Even so, the Democrats made some glowing promises in their platform—it was much more specific in this respect than in 1956—and there will be some powerful pressure groups to see that an effort is made to live up to those promises.

This could mean a new path for the Democratic party. At least a different course than it has been following in the past few years.

The positive "liberal" approach the Democrats are taking may lose the party some votes in the South and elsewhere. But the party's leaders figure this will be more than offset by gains in the East and in other major population areas.

What about the Republicans? . . . The big question now is what path the Republicans will take when they convene in Chicago this week.

They can choose to try to outdo the Democrats with promises.

Or, they can emphasize conservative policies.

If they choose the latter, then the lines between the two parties would become more distinct.

Voters would have a better opportunity to register their choice between a "liberal" and a "conservative" government.

Business and industry would have a clearer choice of economic climates.

Oil's interest . . . In studying the party platforms, it is good to note both the specifics and the broad generalities which indicate the party's general direction.

The platform writers outlined a series of government programs. Obviously this increased federal activity would mean more government spending.

Where would the money come from?

The platform writers say much of it could come from tightening tax loopholes.

They specifically cite "inequitable depletion allowances" as one of these "loopholes."

This platform plank emphasizes the increasing tendency of politicians to shy away from any general tax hike and to rely on hitting some segment of business or industry for increased revenues.

Therein lies the gravest threat to oil's percentage depletion.

This does not mean, of course, that if the Democrats win in November there will be an immediate attempt to cut oil's percentage depletion. But it does constitute an open invitation to anti-oil leaders to add new vigor to their assault.

New party leadership . . . One distinctive trend that emerged from the Democratic convention was the shift of party power to the younger element.

It wasn't just that the party chose a young man for its nominee. Rather, the significance lay in the fact that the old leaders of the party had little real influence.

Harry Truman stayed at home, well aware that he could not turn the tide. So did Virginia's senior senator, Harry F. Byrd.

And the "old timers" who were present got a friendly, polite reception but weren't called to the inner circles when the big decisions were made.

Not since the first election of Franklin D. Roosevelt has a new element emerged so clearly in control of the party.

This same trend may show up in the Republican convention, although not likely to such a degree.

The "older" elements of the party, including Thomas E. Dewey and even President Eisenhower, probably will not call the signals in this one. Richard Nixon, a young man himself, is likely to surround himself with a younger set of advisers.

This trend in each party seems to stem in part at least from a growing feeling that what is needed in this nation is a "postwar approach" by leaders whose attitudes and philosophies jelled after the war, rather than before it.

New oil leadership, too? . . . It may well be that the oil industry is also at a crossroad.

The industry, like the political parties, may be forced to turn more and more to the "younger set" and to new approaches to old problems.

Some long-established views and practices may have to be abandoned. Clearly, a status quo is difficult to maintain in changing times.

There can be little doubt, for example, that there is likely to be more—rather than less—federal government involvement with oil industry problems and policies at home and abroad.

Government regulation of oil imports is certain to continue in the foreseeable future.

Federal Power Commission regulation of natural-gas producers is almost certain to remain in one form or another.

These examples and others point up a decision the industry is facing: Whether to give ground slowly, fighting every inch of the way, or to move on the offense and seek to play a key role in shaping a new industry-government pattern.

Like the political parties, the industry may need to draft a new campaign platform.

Pemex Confirms Big Gas Line

• System would be financed by Mexican bonds, be finished in 18 months after TGT gives the word, Pemex chief says.

PRELIMINARY agreement for a 34-in. natural-gas pipeline from Texas across northern Mexico to California has been signed by Petroleos Mexicanos and Tennessee Gas Transmission Co., Houston.

Pascual Gutierrez Roldan, director general of Pemex, disclosed the signing last week in Mexico City, confirming an earlier report in the Journal (OGJ, July 11, 1960, p. 62).

Gutierrez Roldan said ultimate capacity of the line would be 750,000,000 cu. ft. daily.

The $160-million capital outlay is to be raised through sale of Mexican bonds. The line, extending from Reynosa to San Luis Rio Colorado, some 40 miles east of Mexicali on the California border, will be built with Mexican materials and labor except for U. S. links at both ends.

Gas from Texas and Mexico will be delivered to California for use in power generation in the Los Angeles area. Southern California Edison Co. is reported to be the purchaser.

Preliminary agreement specifies that Mexico will construct the line within 18 months after Tennessee Gas agrees on a starting date. However, Gutierrez Roldan said considerable study and negotiation remain before the project can get under way. Thomas C. Corcoran, attorney for Tennessee, was in Mexico City last week, presumably to confer with Pemex officials.

Mexico would welcome the project both as a market for its gas and for a rapidly amortized pipeline which could supply northwest Mexico economically. Of several proposals to supply California with gas, Pemex indicated the Tennessee project was the only one seeking cooperation with Mexico.

Offshore Lease Rules Studied

. . . by government committee. No big changes are seen, although a number of proposals have been made.

THE DEPARTMENT of Interior currently is asking for suggestions from the oil industry on possible changes in offshore leasing rules.

Thus far, no important changes are in sight, although a special committee set up by Interior has received a number of suggestions. These include:

. . . **Smaller tracts,** to give the small operator a better chance to be a successful bidder. As it is now, some industry people say, the big company is the only one that can afford to bid.

. . . **Fewer tracts** for each bid opening, thus enabling a firm to concentrate on one or more bids rather than having to spread over a large number. The advantage to the government, some say, would be higher bids per tract.

. . . **Eliminate minimum** requirements, or require Interior to accept a bid if it equals or exceeds the minimum set. In the last lease sale, bids below $15 an acre were not considered and some above that minimum were rejected.

. . . **Eliminate nominations.** Currently, Interior asks interested parties to nominate areas to be included in a lease sale and then it chooses areas from these nominations.

. . . **Permit installment payments** of bonuses. This suggestion is designed to help smaller operators. They would be able to stretch bonus payments over the life of the lease rather than having to put all the money up at the start.

These suggestions were among those received by a special nine-man committee appointed by Under Secretary Elmer Bennett after some complaints following the last federal offshore lease sale.

The committee chairman is James Beirne, assistant director for operations of the Bureau of Land Management. He and two other BLM officials are on the committee, together with three members from the Office of Geological Survey and three from the Solicitor's office.

Beirne spent a week recently in the Gulf Coast area talking to offshore operators to get their comments and suggestions.

Committee's view . . . Although the committee has not yet made a report to Bennett, it is understood that it will be slow to recommend any major changes in present practices.

On the matter of smaller tracts, for instance, it appears to be the committee's feeling that BLM already has offered small tracts on occasion, and that the size of the tracts should depend on tract locations, interest in the area, and other factors.

Regarding minimum bids, Interior may eventually decide to eliminate them. But it will not agree to accepting a bid that meets the minimum regardless of other considerations. That is, the Secretary of Interior is certain to insist on maintaining the right to pass judgment on a particular bid, even though it does exceed the minimum set by Interior.

The suggestion that bonus payments be put on an installment basis has support from some committee members. The drawback, however, is the fear that an operator might lose interest in an area and abandon it before he has completed his bonus payments.

The committee is still open to suggestions. Anyone with a proposal should write or call Mr. Beirne, Bureau of Land Management, Department of Interior, Washington 25, D. C.

Bankers Keep Close Tab on Oil Management

• Industry's ability to attract much needed new capital for expansion over next decade depends on its handling of world-wide surplus problem, bank economist warns.

THE financial stability of the oil industry depends on how intelligently management handles the present world-wide surplus of crude.

Bankers particularly are watching industry moves to meet the dramatic challenge. The reason: A sustained flow of capital can be assured for the industry only if the surplus becomes a comfortable cushion of future supply rather than a suffocating blanket of excess production.

That is the report of Edward Symonds, petroleum economist for the First National City Bank of New York in an address to the southwest graduate school of banking in Dallas.

Symonds declared the oil industry must manage its surplus without "becoming ensnared in controls and regulations that would cramp its future growth—yet without running to such excess that the necessary investment funds would be scared away."

New money . . . A steady flow of capital is becoming increasingly important to the oil industry, Symonds warned.

He cited these statistics emphasizing the trend:

. . . A group of 25 integrated U. S. oil companies in 1960 plans to pour $2.6 billion into plant and equipment, a rise of 6% over last year.

. . . Domestic oil and gas industry by the end of this decade may need to invest at a rate of some $8 to $10 billion a year.

. . . Western European oil and gas investments may reach $3 billion a year within 10 years.

. . . The industry's capital needs in all areas over the coming decade may add up to $150 billion in today's dollars.

In the past, oil companies have had to raise about 15% of their long-term capital needs from sources outside the oil industry.

"Even if parts of the investment effort can be scaled down," Symonds said, "we cannot expect to see the industry covering all its future financial needs from internal sources.

"If it is to raise the necessary sums, it must be able to offer an attractive return to outside investors."

Too successful . . . The dilemma for management is that one branch of the industry, the explorationists, through successful efforts has caused the most serious oil industry recession in the last quarter century.

Symonds noted that on top of rich discoveries in the Middle East and Caribbean, the deserts of North Africa now have revealed oil reserves about twice as large as those of America.

The result of these world exploration successes is some 6,000,000 bbl. daily of shut-in production capacity compared with a free world consumption of some 17,000,000 bbl. daily. It's also comparatively easy for the extra pipelines, tanks, and terminals to convert a million barrels of reserves into another million barrels of surplus.

Symonds reminded that the stock market has shown how drastically it discounts the future earnings potential represented by the 250 billion barrels of proved oil and the untold volumes of natural gas now available.

The experience of a group of 10 major oil companies is an example. In the 10 years ending December 1957 these stocks had shown a five-fold increase while the Dow Jones industrial average rose only half as fast. But an abrupt end to this climb occurred in 1958 and 1959. The oil stocks began to drift uncertainly downward while the Dow Jones average still continued its climb to an all time high. The first half of 1960 has done little to improve oil's record.

The drop in stock values may be a little overdone, however, Symonds observed. Some investors now are impressed by the fact that some of the solidly established oil stocks have been selling at only 10 to 15 times earnings, compared with 17 for the Dow Jones average, 20 or more for some chemicals and metals, and around 40 for some of the glamor stocks.

The outlook . . . The bank economist had one hopeful observation.

The desire for comfort and leisure has never been completely satisfied in any society, he said, adding that more and more mechanical energy certainly will be needed in the world. This fact should be reflected in an expected growth in demand for energy in the free world of 3% a year for the next 10 years.

The prospect is that use of oil and gas in Europe likely will rise from about one fourth of total energy supplies to one-third by 1965. And in the world as a whole oil and gas may account for more than half the total energy used. This means an expansion in the petroleum market of about 3% a year in the U. S. and 7% a year in the rest of the non communist world.

Controls . . . The efforts to manage surplus petroleum capacity have raised several fundamental policy issues.

Calls have been heard for:

. . . A national fuels policy. The argument is strong, Symonds said, against turning the present energy pattern into a straight jacket both in America and Europe.

. . . Stricter import controls. Idea is to insulate the American market from world influences and set the stage for a sustained increase in domestic crude prices. This could be dangerous and cause petroleum to lose markets to other sources of energy ready to move in if crude prices get out of line.

. . . International proration. Unending difficulties would be involved in trying to get governments of producing countries, let alone consuming countries, to agree on a system of limiting national production.

He noted in other years the industry has got used to sudden changes in the pattern of production, trade, and markets. It will likely continue to adjust rapidly to them rather than attempt to sweep back the tide.

PROCESSING

Firestone Tire & Rubber Co., Plastics Division, will expand the capacity of the polyvinyl chloride resins plant at Pottstown, Pa. Completion is expected by early 1961, with Catalytic Construction Co. handling the engineering, purchasing and construction.

Phillips Chemical Co. will add another 5,000 long tons per year capacity to the 20,000-ton per year polybutadiene plant now being built at Borger, Tex. The 25,000-ton plant is expected to be in operation late this year.

A styrene unit is being constructed by Sunray Mid-Continent Oil Co.'s subsidiary, Suntide Refining Co., at its Corpus Christi, Tex., refinery. The new unit will produce 60 million pounds of styrene a year and can be expanded to 75 million pounds annually when needed. The construction will begin in November and produc-

Return on Net Assets

(Per cent)

Year	Petroleum	Total manufacturing	Chemical products	Autos and trucks
1950	15.2	17.1	21.3	32.3
1951	16.7	14.4	16.3	17.5
1952	14.5	12.3	13.7	18.5
1953	14.4	12.5	13.3	18.0
1954	13.9	12.4	14.5	21.1
1955	14.2	15.0	17.7	29.1
1956	14.7	13.9	15.6	15.7
1957	13.6	12.8	14.0	16.4
1958	10.2	9.8	11.1	8.8
1959	10.0	11.6	14.4	17.4

Symonds on earnings:

In Oil, Not Fancy but Good

EARNINGS in the oil industry are not as fancy as many critics would have the public believe. The percentage return on net assets often is better in other industries (see table).

However, in the past a combination of factors has given the oil industry a solid basis on which to build a financing program.

Although the percentages may not be the best in the world, the volume of returns in the oil industry has remained impressive. Oil-company earnings after tax, for example, were $2.8 billion in 1959.

Even more impressive and important is the cash flow obtained by adding back to earnings the funds from amortization, depreciation, and depletion. In 1959 this total for the oil industry stood at nearly $5 billion.

This solid financial basis imposes on oil management one clear responsibility, according to Economist Edward Symonds of First National City Bank of New York. He observed:

"Its capital needs are on such a scale that, like Caesar's wife, it must not appear to be drifting along, simply criticizing the inevitable."

New TGT Venture

. . . in marketing will move Bay brand into Tennessee.

Tennessee Gas Transmission Co. is preparing to enter the Tennessee retail product market for the first time.

Through its Tennessee Oil Refining Co. division, the Houston firm is building an 85,000-bbl. products storage terminal at Knoxville, Tenn., to supply new retail outlets of the company and also to service independent jobbers and distributors.

The company currently is building two service stations and has planned a number of others. The extent of its expansion program was not disclosed. The stations will market Tennessee's "Bay" brand of gasoline.

The storage terminal will be connected with the terminus of the Plantation Pipe Line by a 5,000-ft. 8-in. pipeline. Plantation moves products into the Knoxville area from Baton Rouge.

General American Tank Co., Chicago, has the contract for building the storage tanks. Other facilities include an office building, warehousing, and truck loading facilities. These, along with the pipeline, will be built through a Tennessee Gas subsidiary, East Tennessee Natural Gas Co., Knoxville. Completion of the work is set for November.

Bay products have been sold for several years in 16 Rocky Mountain, southern and New England states.

BRIEFS . . .

tion is scheduled for the spring of 1962.

New gasoline plant near Minneola, Kans., will be built by Skelly Oil Co. to process gas from Skelly wells in Meade County field. The plant will recover 15,000 gal. of products daily. Residue gas will be delivered to Kansas Power & Light's Minneola booster station. Propane will go to existing LPG markets and heavier components will be trucked to the El Dorado refinery. Construction will begin in September.

Continental Oil Co. has completed a new natural-gasoline plant in southeast New Mexico's El Mar field and finished expansion of its Ramsey plant near Pecos, Tex. The projects, costing more than $1 million, give Conoco a processing capacity of 10 million cubic feet of gas daily in the area. The plants will be connected by a 25-mile 3-in. pipeline now under construction. Both plants are skid-mounted, package-type units.

DX Sunray plans to build a new 85,000 bbl. daily crude-oil distillation unit at its Tulsa refinery, replacing five old crude units now in operation. The old units, with a combined capacity of 70,000 bbl. daily, will be dismantled or used for other processing. Completion of the new unit is scheduled for 1962.

A new world's record in safety for petroleum refineries has been set by the Port Arthur plant of Texaco Inc. The new record is 7,647,716 plus man-hours of operating time without a lost-time injury. Previous record, according to API statistics, was 7,506,-711 man-hours held by Esso Standard's Baton Rouge refinery.

Also for Refiners . . .

IN THE NEWS: Coastal independent refiners have successfully switched their marketing methods from cargo gasoline sales on spot market to both retailing and wholesaling (p. 122) . . . Fuel-oil men are making progress in reclaiming some of their markets from natural gas (p. 126) . . . Gulf will continue Wilshire name in West Coast marketing, use of Gulf brand is still down the road (p. 136).

PLUS THESE TECHNICAL REPORTS: Excess processing capacity plagued refiners in first half (p. 162) . . . Marketers are walking a tight rope this year (p. 168).

California Gas Line Approved Over Protests

• FPC examiner recommends permit for Rock Springs Project, a $150-million system to deliver gas from Canada, the Rockies, and Texas Panhandle.

THE ROCK Springs project which will deliver 470,000,000 cu. ft. daily of natural gas to California was approved last week by Federal Power Commission Examiner Emery J. Woodall.

Woodall overrode strong objections of California fuel-oil dealers in recommending approval to the full commission, which could grant the permit in 30 days if no appeals are filed. Completion is expected in the fall of 1961.

The joint $150-million project, planned by Colorado Interstate Gas Co. and El Paso Natural Gas Co., will be supplied by 200,000 M.c.f. daily from the Texas Panhandle, 200,000 M.c.f. daily from the Rocky Mountains, and 150,000 M.c.f. daily from Canada. CIG will sell part of the gas to existing customers.

The project . . . The pipeline will require the following construction:

. . . **Colorado Interstate** will lay almost a complete new line from the Texas Panhandle to Denver—109 miles of 26-in., 135 miles of 34-in., and 100 miles of 30-in. It will install 78,000 hp. in compression.

CIG's 380-mile 22-in. line which delivers gas from Rock Springs, Wyo., to Denver will be reversed. The company also will build a 155-mile 34-in. line from Green River, Wyo., on the Pacific Northwest Division of the El Paso system, to Provo, Utah.

. . . **El Paso Natural** will build 395 miles of 34-in. from Provo to the California border near Las Vegas, Nev.

. . . **Southern California Gas Co.,** and Southern Counties Gas Co. of California, which will take the gas in the Los Angeles area, will build a 93-mile 34-in. line from the border at Ivanpah to Newberry, Calif.

Final hearings on this section of the line are scheduled by the California Public Utilities Commission July 28 and 29.

The supply . . . Much of the gas supply will come from a package once committed to Natural Gas Pipeline Co. of America for the Chicago area.

Colorado Interstate will provide 200,000 M.c.f. daily of its own supply in the Texas Panhandle. It will divert 100,000 M.c.f. daily from Denver and a like volume which was committed to the Natural project before it fell through. This 200,000 M.c.f. daily will come from El Paso's Pacific Northwest supply.

El Paso will import 150,000 M.c.f. daily from Westcoast Transmission Co., Ltd., in Alberta through its Pacific Northwest system, which will connect with CIG in southwestern Wyoming.

Resid Price Hike Protested

. . . by New England Council. Its contention: Higher costs are due to government interference with normal supply.

A NEW England delegation last week called on the Government to do something about the recent price increase in residual fuel oil.

The group, the powerful New England Council, representing industries and businesses in that area, charged that the import-control program was responsible for the recent hike of 15 cents a barrel.

This hike, the council said, amounts to about $10 million annually for residual fuel oil users in that area.

They contended that such an increase in their costs puts them at a competitive disadvantage. Furthermore, they said they don't see how this is going to help the domestic oil producers anyway.

The appearance of the delegation in Washington tended to spotlight one of the big problems inherent in the oil-control program: Price changes.

There can be little doubt that any time there is a hike in any oil prices, there will be delegations going to Washington to protest and to call for government action to stop the price rise.

The president's original proclamation setting up the control program left the door open for such moves because it specified that the Government would keep an eye on prices.

The question still to be answered, of course, is what size of price hike would cause the Government to step in.

Also, as Under Secretary Elmer Bennett reminded the delegation last week, the Government may also find it necessary to move in in cases where prices get too low. He pointed out that such a possibility had been raised not long ago by a group of producers who called on him to complain that the present level of controls has not been sufficient to prevent price deteriorations.

The New England group, after meeting with Bennett and other Interior officials, conferred with officials of the Office of Civil and Defense Mobilization. Bennett had suggested that they do this because, he said, Interior does not have jurisdiction over prices.

Bennett also told the group that Interior plans to develop rules under which any increase in residual import quotas for the purpose of rebuilding low stocks is actually used by the oil firms to rebuild their inventories. He said that in the past, some companies, instead of rebuilding inventories, had used the larger quota to "dump" resid at low prices in new markets.

PIPELINE

Cancellation of a 233-mile 8-in. line by Peace River Oil Pipe Line (B.C.), Ltd., from the Milligan Creek area of British Columbia to Trans Mountain Oil Pipe Line in Alberta was announced last week. Peace River blamed "impossible" conditions stipulated in the permit granted last April by the Birtish Columbia Government. Peace River said the project could not be financed in the face of a requirement for possible diversion of British Columbia crude to any future line built entirely within the province.

Contract to lay a 96-mile line from Cody, Wyo., location of Husky Oil Co.'s refinery, to a connection with Yellowstone Pipe Line at Billings, Mont., has been awarded to W. E. Claycomb & Son Construction Co., Cody. Continental Pipe Line will supervise construction for Husky Pipe-

Texas Sticks With 8 Days

. . . for the fourth month. The low August allowable is supported by the independents and six major buyers.

A HEAVY national gasoline inventory plus continued high refinery runs scared Texas last week into holding to a "starvation diet" of 8 producing days for the fourth consecutive month.

The Texas Railroad Commission fixed the August oil allowable at 2,630,069 bbl. daily. This is 33,460 bbl. daily over the allowable initially fixed for July and 14,754 bbl. daily over that in effect July 2.

The increase stems solely from allowable given new wells completed during the month. The 8-day pattern was supported by independents who testified at the hearing with about half the major crude purchasers.

Gulf, Phillips, Cities Service, Conoco, Sinclair, and Indiana Oil Purchasing, among the major buyers, also favored 8 days.

No one sought a lower schedule. But five majors asked for 9 days and two more sought 10.

Humble Oil & Refining Co., which recommended 10 days along with Standard of Texas, said on 8 days it would have to buy on the spot market roughly 10,000 bbl. daily over and above the considerable volume it had already committed itself to buy next month. Standard of Texas testified it needed 10 days of production from its connections in order to meet new military demand for products.

TEXAS ALLOWABLE BY DISTRICTS

District—	August	Increase from July 2
1. Southwest	49,063	140
2. Gulf Coast	103,354	843
3. Gulf Coast	342,671	67
4. Southwest	174,374	1,357
5. East Central	28,168	135
6. Outside East Texas Field	112,136	2,414
6. East Texas Field	122,482	326
7-B North Central	153,661	755
7-C West Central	123,370	1,378
8. West Texas	1,035,845	3,233
9. North Texas	248,049	2,621
10. Panhandle	136,896	1,485
Total	2,630,069	14,754

Figures worked up in advance of the hearing by the commission showed that total stocks of crude and products now stand at about 39,100,000 bbl. over the volume indicated by oil companies last March as desirable.

Stocks of gasoline were reported 26,800,000 bbl. over the desired level, kerosine 4,400,000 bbl. too high, distillate 10,000,000 bbl. too high, and residual 200,000 bbl. over. Crude-oil stocks, on the other hand, stood at 2,300,000 bbl. under the desired level.

Electronic Heater

. . . to stimulate heavy-crude flow due test in Montana.

ELECTRONIC oil-well heating will be tried late this summer in a 3,500-ft. Montana viscous-crude well.

Raytheon Co. is working with Petro-Electronics Corp. of Denver to build the equipment and start the test. Petro-Electronics engineers are contributing their geological and oil production experience, and Raytheon is contributing the electronics know-how to the joint effort.

Between 5,000 and 10,000 watts of power will be packaged into a 6-in. diameter capsule which will be lowered into the oil well.

Tests show that production of viscous oil can often be stimulated by the application of heat at the bottom of the hole. The Montana test has been set up to evaluate the new heater's ability to increase the flow of oil into the well bore.

Raytheon says the new tool uses very high-frequency electronic generators. The microwaves from the generators provide the quick-acting, penetrating heat that the petroleum engineers feel is needed, Raytheon engineers say.

Bill Tomberlin, independent oil operator and president of Petro-Electronics, said that additional tests are planned in wells of different depths and in different producing formations than the first Montana test.

BRIEFS . . .

line Co., owner of the line. A pump station will be built at Cody with completion scheduled for October 15.

A 65-mile trunk line and 30 miles of gathering lines will be built by Rocky Mountain Natural Gas Co., Denver, Colo., linking fields in northern Mesa County, Colorado, with towns between Collbran and Montrose. H. C. Price Co., Bartlesville, Okla., has the contract to lay these lines as well as the city distribution systems involved in the $3-million project. Completion is planned for fall.

Trans-Canada Pipe Lines, Ltd., has awarded a contract for a 51-mile 30-in. line in Manitoba to Majestic Contractors, Ltd. The line, originating on the Trans-Canada system at Iles des Chenes, near Winnipeg, will deliver gas to Midwestern Gas Transmission Co. at the Minnesota State border.

More than 500 miles of branch lines and 114 miles of main line has been contracted by Northern Natural Gas Co. Panama-Williams Corp., Houston, Tex., will install 100 miles of 30-in. and 14 miles of 24-in. loops between Beaver, Okla., and Minneapolis, Minn. Completion will be by October 27.

The branch lines will be laid by Prairie Construction Co., Lubbock, Tex., 114 miles of 2 to 12-in. in Iowa; R. E. Reutzel Co., Freemont, Neb., 89 miles of 2 to 6-in. in Iowa; Underground Constructors, Dodge Center, Minn., 28 miles of 3 to 6-in. in Iowa; C. S. LeNoir Construction Co., Austin, Tex., 134 miles of 4 to 16-in. in Wisconsin and Minnesota; Pipeline Welding Co., Tulsa, Okla., 163 miles of 3 to 24-in. in Minnesota.

Nineteen communities in Minnesota, four in Wisconsin, and 34 in Iowa will be connected this year to the Northern Natural Gas Co. transmission system.

Also for Pipeliners . . .

IN THE NEWS: Pemex approves plans to finance proposed Texas-Mexico-California gas line (p. 131) . . . FPC examiner gives approval to controversial Rock Springs natural-gas pipeline project which will bring gas from the Texas Panhandle and Canada into the West Coast market (p. 134) . . . Marathon Pipeline can check on operation conditions by phone (p. 137) . . . First shipment of big pipe for Libyan crude line swims ashore (p. 140).

PLUS THESE TECHNICAL REPORTS: Pipeliners set for big second half after a slow start in 1960 (p. 170) . . . Why consumer gas prices are high (p. 172).

Gulf Brand on West Coast Is "Down the Road"

- Purchase of Wilshire won't change things immediately, but Gulf is thinking of making petrochemicals, adding Washington and Oregon to its marketing territory.

GULF OIL Corp.'s recent purchase of Wilshire Oil Co. of California will have little effect on Wilshire's operations for the present, but the future is something else.

With the Wilshire purchase, Gulf jumped into the middle of the fast-growing West Coast gasoline market. Wilshire is California's biggest independent marketer and refiner, selling about 5% of the state's gasoline. It ranks just under the seven established major-brand marketers in California (OGJ, June 27, p. 80).

Gulf is "hopeful of some day bringing the Gulf flag to the West Coast," according to Raymond D. McGranahan, the Gulf man named to Wilshire's presidency. However, the company has no definite plans or timetable for moving in with the Gulf banner.

The company will continue to sell under the Wilshire brand and follow generally the same policies. Wilshire markets as an independent, selling 2 cents under the majors.

McGranahan formerly was administrative vice president and coordinator of transportation for Gulf. He succeeds Edwin G. Coopman, who will continue as a member of Wilshire's board.

Gulf's production and exploration activities on the West Coast are handled through another affiliate, Western Gulf Oil Co., which headquarters in Bakersfield, Calif., and operates under Gulf's Denver division office. Western Gulf and Wilshire will continue as separate operations, at least for the present.

Wilshire's operations . . . McGranahan touched on two possible expansions Gulf may make now that Wilshire is part of the Gulf family.

One involves petrochemicals. He said Wilshire will "look at" the possibilities of producing benzene and naphthalene, two petrochemicals in short supply on the West Coast. Wilshire could produce these products by adding downstream processing at its 33,000-bbl. refinery at Santa Fe Springs in suburban Los Angeles.

The other expansion possibility involves moving into the Washington and Oregon marketing picture, but it is doubtful this move would be made anytime soon. Gulf considers these two states as part of Wilshire's marketing territory. Neither Gulf nor Wilshire markets in either state at the present.

Raymond D. McGranahan

Wilshire is primarily a California marketer. Of the 750 stations selling Wilshire products, all but about 40 are in California. These are in either Arizona or Nevada.

Coopman, a veteran California oil executive, points out Wilshire has "no plans for Washington or Oregon at this time."

Crude supply . . . Wilshire's crude supply is split about 50-50 between domestic and imported crude.

The company buys about 13,000 bbl. daily of California crude and about 2,400 bbl. daily of Four Corners crude. The Wilshire refinery is connected with Four Corners Pipe Line, which in turn is owned 20% by Gulf.

The only Western Gulf crude purchased by Wilshire is crude acquired in exchanges or swapout for import quotas. Western Gulf has about 6,000 bbl. daily production, primarily in the San Joaquin Valley. Most of this crude goes to refiners in that area rather than moving south to Los Angeles refineries.

McGranahan joined Gulf in 1948 as a member of the staff of the assistant to the president. He was named director of coordination in 1953.

He was named a Gulf vice president in 1954. He was charged with directing and coordinating all forms of transportation for the company. He was elevated to administrative vice president in 1958.

Pan Am Buys Half of Texas Gas

PAN AMERICAN Petroleum Corp. has moved into the intrastate gas transmission business in Texas by acquiring half the stock interest in Texas Gas Corp.

Pan American is a large natural-gas producer in Texas and already is a supplier to Texas Gas. The stock acquisition should be mutually beneficial because it will give Pan American an assured gas market and Texas Gas an assured supply.

The 400-mile 2-to-24-in. gas system moves about 160 million cubic feet daily from Galveston Bay to industrial customers in the Beaumont-Port Arthur-Orange area.

Texas Gas Corp. also owns a gas-processing plant and platforming unit at Winnie, Tex., which processes about 180 million cubic feet of gas daily and 6,000 bbl. of condensate. In connection with the Winnie plant, Texas Gas owns a deepwater marine storage terminal at Port Neches and a 30-mile products line to Winnie. The two-way line moves gasoline and kerosine from Winnie to the terminal, and condensate to Winnie.

In acquiring its interest, Pan American purchased 50% of the stock held by the three stockholders in Texas Gas—Carl M. Loeb, Rhoades & Co.; Godfrey L. Cabot, Inc.; and Russell M. Riggins, Houston, president of Texas Gas.

Riggins will continue as Texas Gas president, and no changes in company management are expected. Pan American will have four members on the 10-man board of directors — G. F. Moore, Tulsa, manager of gas sales; J. P. Hammond, Tulsa attorney; S. B. McCabe, Gulf Coast division accountant at Houston; and E. O. Patterson, division staff engineer at Houston.

Tthe other six directors are Riggins; Gene M. Woodfin, Houston, and Mark J. Millard, New York, partners in Loeb, Rhoades; E. L. Green, Jr., Pampa, Cabot Carbon; Sidney S. McClendon, Jr., Houston attorney; and Alfred Brittain III, New York, vice president of Bankers Trust Co.

A D-A-T-A UNIT is installed by its developer, L. J. Schwartzkopf.

Talking Unit Reports Flows

. . . at two Marathon Pipeline pump stations. The readings are received in the dispatcher's office by phone.

MARATHON Pipeline Co. dispatchers phone D-A-T-A to check flow-meter readings at two remote pumping stations.

D-A-T-A, a digital-to-audio-translator-accumulator, automatically answers the phone, identifies itself and gives the reading.

It takes from 16 to 25 seconds to get the reading. Formerly, a man had to drive a round trip of 14 miles every 2 hours to make the same check.

Marathon says the device has proved to be the most reliable method found to relay the readings to the dispatcher. A unit in operation near Alton, Ill., gave the flow of 2,700,000 bbl. of oil over a 5-month period with only a 7-bbl. error.

The reporting instrument idea was developed by L. J. Schwartzkopf, a Marathon communications technician. Within a few years the company expects to have over 100 in use along 5,600 miles of line in 11 states.

D-A-T-A weighs about 26 lb. and can be installed at a pumping station in about 2 hours. Communication with the reporting instrument can be by phone or microwave.

When the device is contacted, it identifies itself through a pre-recorded tape attached to a drum which begins to rotate at the telephone or microwave signal.

The revolutions of the drum actuate the proper playback heads attached to the drum. All words and numbers are pre-recorded on the tapes.

Ordinarily the instrument is operated by alternating current, but it is also equipped with dry-cell batteries and an accessory relay in case of power failure.

The unit is much cheaper than another electronic reporting device used by the company and requires less maintenance.

Under a royalty agreement with the pipeline company, Continental Technical Service of Dayton, O., plans to manufacture and market the instrument.

Slick Considering Merger

Slick Oil Corp., Houston, acknowledged last week it has been negotiating with a number of companies on a possible merger but that "we haven't found what we wanted." Reports that the company is ready to merge are premature and "we're not committed to anybody," President A. K. Tyson said.

Slick has about 1,500 bbl. daily of crude production and 13 million cubic feet daily of gas production. About 70% is located in Texas.

A majority of the company's stock is still held by the family of the late Tom B. Slick, early-day Oklahoma City wildcatter.

API Group Pushing Industry Effort to Stimulate Demand

THE oil industry is going all out to make motor travel more attractive as a major way to stimulate gasoline demand.

This was apparent at the July meeting of the API's Committee to Stimulate Gasoline Demand held at the Hotel Drake in Chicago. New name of the group is Travel Development Committee.

Two encouraging reports were given at the meeting.

James Bennett, marketing coordinator on the API staff, told of contacts with newspapers and magazines in an effort to promote more travel-by-auto publicity. He said that quite a few newspapers, apparently stimulated by the 40-page section run by the New York Daily News last May, show definite interest in running special auto travel sections next May.

Grant Young, Ohio Oil Co.'s vice president in charge of market development, reported that contacts have been made with a number of highway safety groups. One of the API group's functions is to cooperate as much as possible with such organizations in promoting highway safety.

One new development disclosed at the meeting was the intention of one company to enter the "U-Drive It" boating business. This company is planning a pilot operation for next spring along the lines of the "U-Haul It" trailer operation.

Program launched . . . Ashland Oil & Refining Co., meanwhile, has launched an all-around company marketing program aimed at stimulating gasoline demand.

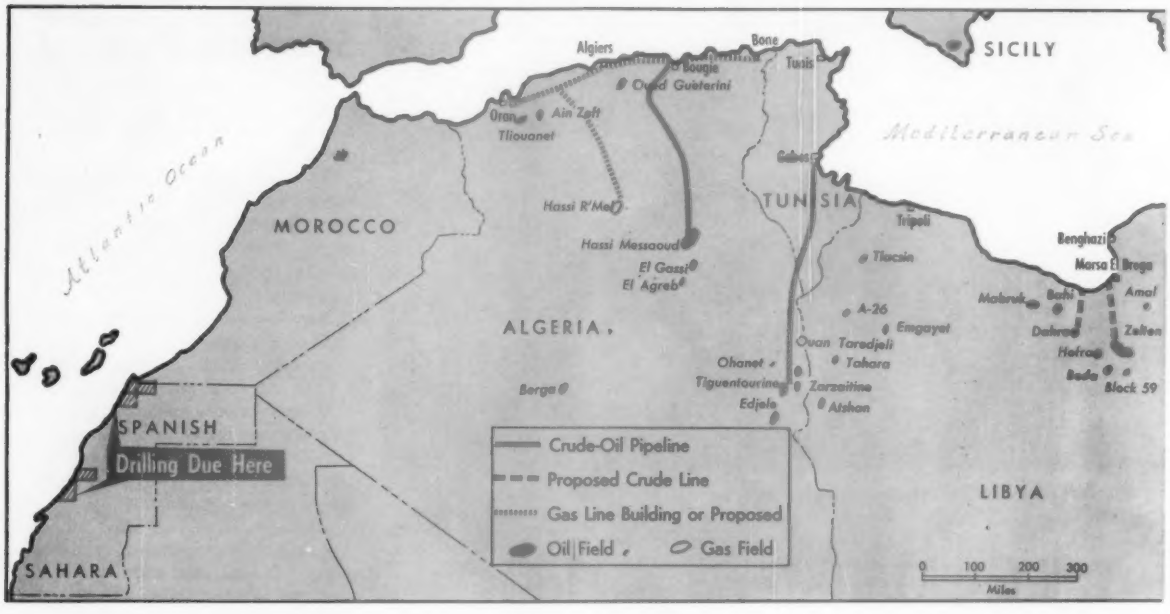
The company has embarked on a summer program involving newspaper, radio, and TV advertising with the theme, "Take to the Road for Fun." The program will wind up Labor Day.

George W. Sisler, advertising and promotion manager, disclosed the extent of Ashland's campaign in a report to the API's Division of Marketing. It is underway throughout Ashland's 12-state marketing area. It consists of:

. . . Advertisements in 200 daily and weekly newspapers based on scenic views from a photographic album of places to see and things to do.

. . . A total of 1,600 musical spots per week over 86 radio stations on the "Take to the Road for Fun" theme.

. . . Six TV stations which carry Ashland programs regularly will have special commercials on the same theme.



North Africa: Activity From the Nile

• Algeria and Libya are setting the pace but the play is extending to new areas. Even the worldwide crude surplus doesn't hinder the boom.

Ray G. Gibson
District Editor

ONLY TIME will tell the exact role of North African oil, but the broad outlines of a big, new industry are coming into perspective.

There is now serious doubt that North Africa ever will match the Middle East. At the same time, all signs indicate the region is fast taking its place with the U. S. Gulf, Caribbean, and Persian Gulf as a nerve center of the world industry. Its strategic position is making this true, even though its potential may, or may not, fall short of other key centers.

This growth is almost phenomenal. The first oil discovery in the Sahara Desert came less than 5 years ago. Today, in contrast:

... **Five major pipeline** systems are in the works, or in operation from one gas and four oil fields.

... **Companies scramble** for open acreage in Algeria and Libya, while concession rights go begging in Kuwait and Iran.

... **Exploration is spreading** east and west, to Egypt's Western Desert, and the Spanish Sahara.

... **European markets** are already taking North African crude, and making room for more.

Late start . . . Decades-long delays in exploration and nearness to Europe are two of the main reasons why North Africa is booming in the face of a world-wide crude surplus.

Exploring for oil has always been carried out under adverse conditions. But a lack of surface indications, climate, and inaccessibility in the Sahara Desert, and economic and political troubles in Europe all worked against major exploration in North Africa until after World War II.

The oil play is now centered in Algeria and Libya. But large regions of Tunisia and Morocco are under license. Companies are preparing to start work on new concessions in the Spanish Sahara. Egypt is reopening its Western Desert to exploration. Two years ago a combine of four American companies gave up there after a $30 million program.

When the Spanish Sahara and Egyptian programs get under way, the North African oil play will extend 2,500 miles from the Atlantic Coast to the Nile River.

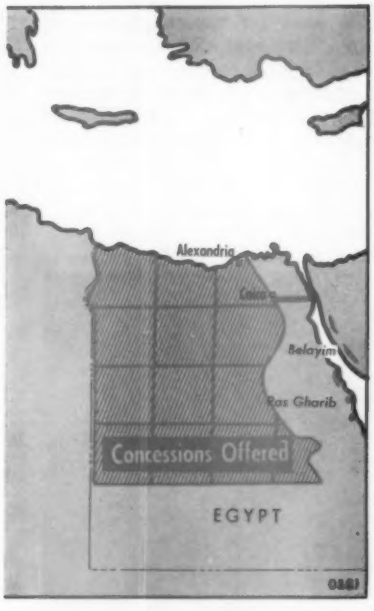
The first oil find, at Edjele, was made late in 1955. Since then, the Suez crisis, French desire to become self-sufficient for oil, an aggressive search by private companies in Libya and an oil law that keeps them humping, have combined to make North Africa the dark horse of the world's oil provinces.

Short haul . . . The key to the expansion is the region's nearness to Europe. Aside from offering a major source of crude supply in the event of another Suez shutdown, North Africa has by far the shortest tanker runs.

The distance from Bougie, Algeria, the Mediterranean terminal of Hassi Messaoud pipeline, to Marseille, is 410 miles. Rotterdam is 1,885 miles. The run from Gabes, Tunisian terminal for the line from CREPS' production in Algeria, to Marseille is 730 miles, and to Rotterdam, 2,430 miles.

The run from the Gulf of Sirte, where a tanker terminal for Esso will be built, to Marseille is 990 miles, and to Rotterdam, 2,700 miles.

In contrast, Middle East oil shipped from eastern Mediterranean terminals has a 1,600-mile haul to Marseille, and a 3,360-mile trip to Rotterdam. The run from the head of the Per-



to Atlantic

sian Gulf to Marseille is 4,850 miles, and to Rotterdam, 6,600 miles, via Suez Canal.

The French say they have a transportation advantage of 50 cents per barrel over the Middle East. Offsetting this is an exploration charge of 15 cents per barrel more in Algeria than the Middle East average. In Libya, where the distances to the coast are shorter, producers will have a greater transportation advantage. But exploration costs are higher (OGJ, July 11, p. 80).

No squeeze yet . . . The French have found takers for most of their planned production in the Sahara for the next 3 years. The latest government estimates place output this year at 170,000 bbl. daily. Of this, 130,000 bbl. daily will come from Hassi Messaoud, held jointly by S.N. Repal and CFP. The remaining 40,000 bbl. daily will come from CREPS fields in the Edjele area, which will have a pipeline outlet in operation this year.

The 1961 timetable calls for an average of from 340,000 to 380,000 bbl. daily. Hassi Messaoud should supply 170,000 to 180,000 bbl. daily, and the CREPS' fields, from 170,000 to 180,000 bbl. daily.

The 1962 schedule calls for 380,000 to 500,000 bbl. daily, Hassi Messaoud will supply 200,000 to 280,000 bbl. daily, and the Edjele area from 170,000 to 220,000 bbl. daily.

All major companies have made agreements with the French to take a share of the orphan crude, which production is over and above the markets of the producing companies.

Royal Dutch-Shell, which has various affiliates that make it the largest marketer in France, will be the biggest taker. It will absorb 13 million tons of French oil through 1962. Over a 3-year period this will amount to about 87,000 bbl. daily.

Most of the Shell crude will come from the Edjele region. The company has 35% interest in CREPS, but will take 55% of the production. Shell also has agreed to buy 2.25 million tons of Hassi Messaoud crude from S.N. Repal in the period, or about 15,000 bbl. daily. In addition, it will take a share of SPAEF production in Gabon, and COPESEP production in the Paris basin.

Jersey Standard affiliates will be the second biggest buyers, taking 6 million tons of French oil in 3 years, or about 40,000 bbl. daily. This will include output from Parentis and other small Esso-Rep fields in Southwest France, which average about 24,000 bbl. daily.

British Petroleum will take 4 million tons, or 27,000 bbl. daily, including some Gabon oil. Mobil will take over 7,000 bbl. daily of Saharan oil, and over 2,000 bbl. daily of Gabon oil. Gulf Oil and Caltex will buy small amounts of Saharan oil this year.

The sales agreements largely let S.N. Repal off the hook for the immediate future. It expects to have 30,000 bbl. daily available in 1962 for which no outlet has yet been found. Some of this may be partly absorbed by CFP, and some will be processed in the refinery Caltex is turning over to its new joint refining and marketing venture with the French. But there still is expected to be output available for export.

CFP is marketing its share of Hassi Messaoud output on its own, in addition to its share of rising production in Iraq.

Five finds . . . Of the five commercial areas undergoing intensive commercial development in North Africa, three, Hassi Messaoud, Edjele, and Hassi R'Mel, are in the French Sahara. Two, Zelten and Dahra, are in Libya. Here is a rundown:

. . . Hassi Messaoud output is averaging better than 126,000 bbl. daily. A new pumping station near Biskra has increased capacity of the 24-in. pipeline to the coast to 165,000 bbl. daily. Recoverable reserves are estimated at about 2-billion barrels.

. . . Edjele-Zarzaitine fields will open in October, when a 24-in. pipeline to Gabes, Tunisia, goes into operation. The line is already completed. Hydraulic fracturing is having notable success in marginal producers. After treatment, two non-producers flowed more than 250 bbl. daily, and small producers increased from 190 bbl. to 377 bbl. daily. After one treatment, a non-producer flowed 1,570 bbl. daily. Deepest of several pays is 4,500 ft.

. . . Hassi R'Mel gas field will supply fuel for a major steel center at Bone, Algeria, newly approved by the French Government. A 24-in. pipeline is already under construction to the coast and will open early in 1961. Conch International, owned jointly by Shell, Continental Oil, and Union Stockyards, will have half interest in a company planning a gas liquefaction plant on the North African coast. A preliminary agreement has been reached. Continental and Union Stockyards are pioneers in shipments of liquefied methane. An Italian group is studying a possible pipeline from Hassi R'Mel to Italy, with a 77-mile sea crossing of the Sicilian Channel. Field reserves are at least 30 trillion cu. ft.

. . . Zelten will have an outlet in a matter of months when Esso Standard (Libya) opens a 100-mile 30-in. pipeline from the field to a Mediterranean terminal at Marsa El Brega. The first shipment of pipe is now being floated ashore.

The company is running tests on Zelten 8, an infill well between Nos. 1 and 2 which were completed as 17,500-bbl.-daily and 15,000-bbl.-daily producers. Three other field wells were completed in the 1,500 to 2,500-bbl.-daily range. Zelten 7, a 13-mile stepout to the southeast, is a dry hole.

. . . Dahra's latest well tests 11,500 bbl. daily, the third best in Libya. There are 11 oil or gas wells in the field, and Oasis Oil Co. has asked for bids on a big-inch pipeline to the coast. Oasis is operator for exploration, production, and transportation in Libya for three partners, Ohio Oil, Continental, and Amerada. The parent companies will market the crude separately.

Other success . . . Mobil International has drilled an 890-bbl. daily stepout to its Hofra A2-11 discovery in eastern Libya. The 43.9° - gravity oil flowed from 3,100 ft. through a ½-in. choke. Tests showed 1,300 cu. ft. of gas per barrel. The well is 4 miles from the discovery, Hofra A2-11. German Gelsenberg interests have a 25% interest in the program.

Other Libyan discoveries ranging from a few hundred to several thousand barrels daily include finds made by Oasis at Bahi, and on Block 26,

in western Libya, and on Block 59, south of Zelten. Libyan-American Oil has a find at Mabruk, which is being developed jointly with Esso. American Overseas has a find at Beda, Shell at Tlacsin, Gulf Oil at Emgayet, and Mobil at Amal. Non-commercial finds also have been made in the Fezzan by Esso, at Atshan, and by CFP at Tahara.

Atlantic Refining is the latest American company to join the Libyan oil play. Libyan Atlantic Co., an affiliate, has won a big stretch of offshore acreage extending approximately from Misurata in Tripolitania to Benghazi in Cyrenaica. The rights cover concessions 86, 87, 88 and 89.

Concessions expire . . . A deadline on concession rights is spurring firms to take fast looks at their acreage. One-quarter of the acreage awarded in 1955 will have to be turned back later this year, and large tracts which do not have production will revert to the government before the middle of next year.

The price for concessions will be higher on the next rounds. Companies now picking up open acreage already are offering much better terms than the oil law specifies. A subsidiary of the Italian ENI won a concession with an offer of 30% partnership to the Libyan Government.

PLUGGED PIPE is lowered over the side of the ship into water.

SMALL BOATS tow the floating pipe to shore.

A TROLLEY takes the pipe out of the surf.

Big Pipe Swims Ashore for Libyan Crude Line

THE FIRST shipment of pipe for Esso Standard (Libya's) new 100-mile pipeline is being floated ashore at Marsa El Brega on the Gulf of Sirte.

The 30-in. diameter, 4,000-lb. pipe is the largest ever unloaded from a ship anchored in open sea and towed to the shore by boats or by cable.

Plastic plubs make the pipe watertight for the mile-long ride to shore. Small boats pull the sections from the side of the ship to the beach, where they are loaded aboard a trolley built into the water.

The pipeline will run from Zelten field to Marsa El Brega. It will give the Jersey Standard affiliate a head start in putting Libyan oil on the market. Esso also is planning an offshore loading terminal at Marsa El Brega. Completion dates for the projects are not set, but bids on the pipeline have been sought.

Japan's Import Rules Trim Majors' Markets

A LOOK at the long-term refining and marketing picture in Japan shows why major companies are unhappy over the country's import rules.

Affiliates of international companies still do a lion's share of the oil business, but foreign exchange regulations are eroding the big company slice of the market.

Majors accounted for 72.4% of sales in 1955, when consumption averaged about 190,000 bbl. daily. Last year, the big-company share of the market declined 8.4% to 64%, with demand at 363,000 bbl. daily. Majors accounted for 60.2% of total refinery runs last year, a decline of 10.9% from 4 years earlier.

Unless foreign exchange regulations are changed, the trend will snowball under pressure of cheap crude from Russia and yen crude from new Japanese finds in the Persian Gulf.

The formula for allocating foreign exchange gives 50% weight to allocations for the previous 3 years. It gives 25% weight to imports in barrels, and 25% weight to the number of barrels multiplied by the average f.o.b. price in the 3-year period.

In practice, independents buying crude below average cost are entitled to a bigger exchange allocation on the next go round, and so on. The problem is compounded because the formula considers the f.o.b., rather than the c.i.f. price, which is the actual cost of the oil laid down in Japan.

Idemitsu Kosan, Japan's biggest independent, has signed a contract for 20,000 to 30,000 bbl. daily of Russian crude for 6 years. The Ministry of International Trade and Industry officially considers the f.o.b. price as 97 cents per barrel, compared with an average of $1.60 per bbl. for crude being imported from the Middle East.

This will enable Idemitsu to import 60% more crude for the same amount of foreign exchange.

At the same time, the c.i.f. price is $2.02 per bbl., only 22 cents less than the laid down cost of Persian Gulf oil in Japan. Small companies as well as the majors are complaining that the f.o.b. price is unrealistically low. They are seeking a change in the rules that at least will substitute the c.i.f., for the f.o.b. price in the formula.

The big-four Western companies in Japanese refining and marketing are Stanvac, with 55% interest in Toa Nenryo Kogyo; Caltex, with 50% in Nippon Oil; Royal Dutch-Shell, with 50% in Showa Oil, and Tidewater, with 49% interest in Mitsubishi.

How majors and independents stand in Japan

	Sales		Refinery Runs	
	% of total 1959*	% change from 1955*	% of total 1959*	% change from 1955*
International Group				
Nippon Oil (Caltex)	19.7	−3.4	19.7	− 8.1
Toa Nenryo (Stanvac)	19.1	−3.9	16.7	− 1.9
Showa (Shell)	15.6	−0.5	14.5	2.6
Mitsubishi (Tidewater)	9.6	−0.6	9.3	− 3.5
Total	64.0	−8.4	60.2	−10.9
Bigger Independents				
Idemitsu	13.8	3.1	13.3	13.3
Maruzen	10.7	1.4	13.3	− 2.1
Daikyo	4.5	−0.4	4.1	− 3.0
Total	29.0	4.1	30.7	8.2
Small & Medium Independents				
Nikko	3.0	0.3	2.4	− 0.9
Toa	2.6	2.6	2.0	0.8
Shin Asia	1.4	1.4	3.6	2.3
Others	...	...	1.1	0.5
Total	7.0	4.3	9.1	2.7

*Fiscal year.

Soviets Slight Far East to Get Oil to Cuba

RUSSIA'S DETERMINATION to give Cuba top priority in Soviet oil shipments is temporarily affecting communist crude deliveries to the Far East.

The 40,000-ton, 18-knot Russian tanker "Peking" was abruptly shifted from the Black Sea-Orient run to rush oil to Cuba. Commissioned in January, the ship had already completed two round trips to Japan this year via the Suez Canal.

In the hurry to ship crude to Cuba the Soviet tanker was ordered on to the Caribbean after a collision with the Norwegian tanker "Rondefjell" in the Mediterranean.

Russia has admitted the ship was seriously damaged in the crash.

The "Peking" is the first of a series of Soviet supertankers. A sister ship, "Warsaw," is nearing completion at Leningrad and a third ship, "Budapest," is under construction.

Cuba seeks ships . . . Attempts by Cuba to charter or build its own tanker fleet are meeting with little success.

Premier Fidel Castro's government is sending out feelers to Japan and Scandinavia in an effort to obtain both tankers and dry-cargo vessels which would be used to carry sugar. But Japanese shippers, at least, are turning thumbs down on inquiries for fear of reprisals by oil companies threatening to boycott firms whose vessels are used in the Russia-Cuba oil trade.

Cuba is meeting even more stone walls in its attempts to order tankers. This probably will continue unless the country offers some airtight method of payment in a desirable currency.

Shippers in general say the threat of boycott by Jersey Standard and other companies will not effectively deter Russia from lining up all the ships it needs for the Cuban and other oil trade.

Most of the chartering is expected to be done through hard-pressed firms facing the choice of doing business with Russia or seeing their ships lie idle.

Crude-Price Cut Won by India

. . . from two major importers. This is the third cut in 2 years. It follows Russian offers of oil to the country.

STANVAC and Burmah-Shell have agreed to cut the price of crude brought into India.

Burmah-Shell, a jointly-owned subsidiary of Burmah Oil Co. and Royal Dutch-Shell, promised the Indian government a price reduction of 7½% for crude imports. Stanvac has confirmed an unspecified price reduction of its own. Unconfirmed reports say the Stanvac cut is much greater than Burmah-Shell's and may be as high as 15%.

Negotiations on the price reductions have been in progress for more than a year, but the agreements coincide with a refusal by the companies to process Russian crude and a Soviet offer to India of 1.5-million tons of low-priced products over a 3-year period.

Russia has offered India crude at a 25% discount on the f.o.b. Black Sea price. This works out to about a 25-cents-per-barrel reduction on the laid down price in India, or about 12½% off on a c.i.f. basis.

The Russian-Indian agreement on products calls for shipments of about 4,300 bbl. daily of kerosine and 1,500 bbl. daily of diesel oil in the first 12-month-period after shipments begin. This level will be increased to 10,000 bbl. daily within 2 or 3 years.

Caltex last week was still to come to terms on a price reduction, but talks are in progress.

The three companies refine and market most of the country's 120,000 bbl. daily demand. Burmah-Shell does about 60% of the business, Stanvac 25% and Caltex 15%. Shell has a 50,000-bbl.-refinery at Bombay; Stanvac a 38,000-bbl.-plant at Bombay; and Caltex a 15,000-bbl.-plant at Visakhapatnam.

Government squeeze . . . While the price cut came with a threat of a Russian squeeze, the government has been putting pressure on the companies for a long time. The move is merely the latest in a series of "voluntary" modifications in the refining and marketing agreements.

Last year companies agreed to reduce product prices a total of $10.5 million a year. Two years ago they agreed to a $21 million reduction.

The reductions may not mean lower prices for the consumers. The government is motivated by a dire shortage of foreign exchange and the reduction on products made last year was applied directly to the government's account on company books.

India's foreign exchange costs on oil amount to about $150 million a year. Of this amount, $80 million covers the import of crude and $70 million the import of products.

Oil Minister Keshiva Deva Malaviya reassured the companies that they faced no Cuba-type takeover for refusing to process Russian crude (OGJ, July 18, p. 78). At the same time he made it clear the government was not pleased by the turndown.

It probably would be relatively easy for the government to distribute Russian products if it wants to, since 10 to 15% of the consumption is accounted for by various government branches.

Oil Pay In Turkey

. . . is found by Mobil near the Mediterranean coast.

MOBIL International has made an oil strike in Turkey 40 miles inland from the port of Mersin on the Mediterranean.

Mersin is the site of a 65,000-bbl. refinery now under construction in which Mobil holds a 56% interest.

The discovery, Bulgardag 1, on drill-stem tests indicated a productive capacity of 240 bbl. daily of 36°-gravity crude, before acidizing and fracturing. Oil pay was encountered at approximately 4,700 ft.

Mobil considers the find "particularly important" because of the company's position as leading marketer in Turkey. The oil appears to be of good quality and high gravity compared with other Turkish crudes. If commercial production is developed it will have easy access to the refinery and a deep-water terminal at Mersin.

Bulgardag 1 is Mobil's first discovery after three dry holes and an extensive seismic program dating back to 1955. The company holds exploration licenses on almost a million acres in the vicinity.

FOREIGN BRIEFS . . .

Russian crude production rose to a record 70.7 million metric tons, or about 2,850,000 bbl. daily, in the first half of the year. The increase of nearly 15% over the first 6 months of 1959 exceeded the official goal. Gas production reached 22.5 billion cubic meters, or about 4.38 million cubic feet daily, for a gain of 29%. However, this was less than Soviet goals.

The interim government of South Korea reportedly has canceled a proposed 15,000-bbl. refinery planned by a locally based firm, Korean Petroleum Co. The project, proposed under the government of ex-President Dr. Syngman Rhee, was based on a tie-in with an unidentified American company. The new government is expected to set up a refining plant of its own.

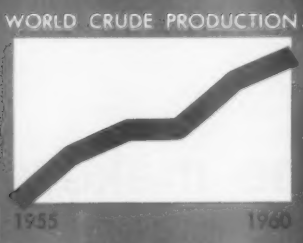
The first tanker shipment of crude from Iran's new Persian Gulf terminal on Kharg Island, is scheduled to load about August 1. Crude is already flowing from Gach Saran field to Kharg Island via a new 100-mile pipeline. Capacity of the line is about 230,000 bbl. daily under gravity flow.

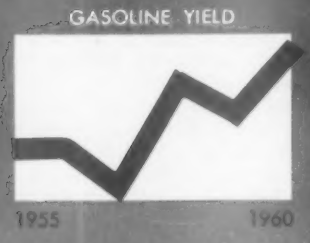
Syria has started negotiations with Concordia, a subsidiary of Deutsche Erdol, on the development of Suwaidiyah field in Northeast Syria. The talks also are covering a 4-year renewal of concession rights which expire in September, and a relinquishment of some of the acreage.

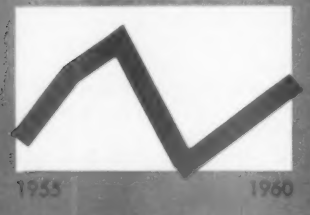
An Iranian wildcat at Gorgan near the Russian frontier blew out and caught fire after encountering high-pressure gas at 600 ft. National Iranian Oil Co. was considering a rush call to Myron Kinley after the well burned 2 days. The company has drilled several tests on the structure.

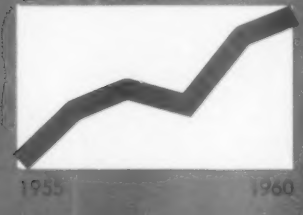
Phillips Petroleum has abandoned its sixth dry hole on its concession in Jordan. The well, at Al-Lisan on the Dead Sea, was bottomed below 14,000 ft. The company is now studying data collected before deciding on further work.

Deutsche Shell's new 85,000-bbl. refinery at Godorf, near Cologne, West Germany, is officially on stream. The plant is supplied by the new Rotterdam-Rhine pipeline which opened in June. It is expected to serve as a model for future Shell refineries built in other parts of the world.









MIDYEAR REPORT

LAST-HALF DRILLING will show a gain of 13% over completions in the first half... Total of 24,095 wells will include 5,484 wildcats and 18,611 field wells. Drilled footage is expected to reach a total of 103,595,000 ft. for the period.

COMPLETIONS for the first 6 months dropped 3,011 wells below last year's total for same period... Loss was in development drilling, down 3,203 wells to 16,624... Wildcats gained 192 wells to 4,709.

DECLINE IN COMPLETIONS was reflected in decreased rotary-rig activity... Average number of active rigs was down to 1,739 from 2,017 for the first half last year.

DOMESTIC DEMAND averaged 9,801,000 bbl. daily in the first half for a gain of 202,000 bbl. daily or 2.1%... Last-half demand will be up about 4.4% from last year. Winter demand should show an increase of 3.7%.

CRUDE PRODUCTION averaged 7,042,500 bbl. daily in first half, down 151,900 bbl. daily... Loss was influenced by: Increased crude imports; cut in refined-product stocks; lower crude-stock gain; smaller increase in crude stocks.

REFINERY RUNS dropped below previous-year averages in February and March to hold first-half total to 8,040,000 bbl. daily... Unused capacity of 1,700,000 bbl. daily posed temptation to increase runs.

CRUDE AND PRODUCT IMPORTS dropped to 1,847,000 bbl. daily from the all-time record set in first half of 1959... Crude imports gained, but products decreased from the record set in first half of 1959.

PRODUCTION OF NATURAL-GAS LIQUIDS increased 7.5% to average 39,337,000 gal. daily... Production rate has nearly doubled in past 10 years. Five states accounted for 82.6% of the total.

MARKETERS WERE PLAGUED with oversupply of both crude and products... Soft product prices increased pressure on crude postings.

GAS PIPELINES will have one of their biggest construction years. Crude-pipeline construction remains depressed, but products-line activity is up sharply from 1959.

NATURAL-GAS PRICES to household consumers have gone up. The way to hold down these prices to consumers is through more efficient distribution. Gas needs new industrial uses other than boiler fuel.

Headline makers

... from the first half's oil news

Castro seizes three refineries in feud over Russian oil

U. S. takes court licking in famed Tulsa case

Supreme Court ruling on tidelands leaves big question

OCAW has rough 6 months with strikes and elections

CAREFULLY deliberated legal action and the intemperate seizure of refineries in Cuba, both topped the news as the sixties began.

From judicial benches in Tulsa and Washington came far-reaching decisions of import to the oil industry.

The federal Government took a whipping in its attempts to prove a conspiracy among 29 major oil companies. U. S. District Judge Royce H. Savage, of Tulsa, dismissed the charges.

The judge said he was personally convinced that there was **no concerted plan among the companies to raise prices** during the shortage caused by the Suez Canal closing in 1956-57. Oil-company lawyers feel the case showed the absolute frailty of trial by innuendo.

In the capital, the U. S. Supreme Court finally issued a decision on tidelands boundaries but left a big question: **What is the starting point a state must use in measuring its submerged lands?**

The court was specific on how far each state will measure. For Texas and the west coast of Florida, the distance is 3 leagues. Louisiana, Alabama, and Mississippi were allowed only 3 miles. More litigation will be necessary to determine the zero line, from which states will apply the measure granted.

As the first 6 months of the year came to a close, Fidel Castro climaxed almost 2 months of pressure against three major refiners when he seized their Cuban plants.

During the squeeze period, the at-times ranting Castro had attempted to get the refiners to process Soviet crude oil obtained by the revolutionary government in a barter deal. Refusal by the refiners ended in intervention.

On the domestic scene, crude-price-pressures were almost constant. In only the third week of the year, the first cuts were made. These were in southeast Texas and the Corpus Christi area.

Warm weather in the first part of the year and the failure of refiners to throttle down their runs caused a **soft market for heating distillates and kerosine.**

Other crude cuts came in April in East Texas, the Corpus area and in the Rocky Mountains. First-quarter reports of oil companies showed the impact of depressed product prices. Total **petroleum demand lagged during the first 2 months,** but crude production and refinery runs were higher than last year.

As the halfway point of the year approached, the **downward pull on crude prices increased.** There were cuts in Kansas, the Illinois basin and Kentucky. The reduction in Kansas by Derby Refining resulted in a controversial shutdown order for the fields in which the company had been purchasing. However, Derby restored the price and raised product prices. What had promised to be a memorable legal hassle was avoided.

Domestic crude producers went to Washington to push for a reduced crude imports level, but Interior Secretary Fred Seaton announced that no changes were contemplated this year.

The **imports program entered its second year** with little fanfare, but lots of swapping was going on. The swaps made during the January through July allocation period totaled 301,041 bbl. daily, or almost a third of the total crude import allowable.

Controversy over the residual-fuel import quotas flared like a wild gasser when Interior increased total quotas for the January-June period by 12 million barrels. Coal forces called for an investigation to uncover the "sabotage" of the control program.

Interior said the cold weather in March and the "irregular marketing pattern" of a few major importers created the danger of a resid shortage.

Third-quarter resid quotas were cut nearly 50% below the quotas for the first six months' allocation period and about 15% below actual imports in last year's third quarter.

The natural-gas portion of the industry hoped for a bill to ease its regulatory problems. Interior Secretary Fred Seaton suggested that initial action on this measure should come from the industry, rather than the administration.

The Independent Petroleum Association of America pushed for action in Congress, but there was little response.

On the Senate side of Capitol Hill **percentage depletion survived another attack** but the opponents of the measure were able to muster more "anti" votes than ever before.

It was a fairly **rough 6 months for the Oil, Chemical & Atomic Workers Union.** The biggest union in the petroleum industry came out second best in several strikes and elections.

At American Oil Co.'s Texas City refinery the longest strike in the history of

Gulf Coast refining ended after 190 days. Contract terms with the OCAW gave management the victory cake. It retained its right to assign work to improve efficiency.

The OCAW local at Indiana Standard's Sugar Creek refinery ended a 241-day walkout without gaining a contract.

Election losses for the union were at Esso's Bayway, N. J., refinery and Baton Rouge refinery. Independent unions won in both instances.

One plum for the OCAW was the signing of a contract covering employes at Humble's Baytown, Tex., refinery. However, the company said this contract was essentially the same as that offered to the independent union last summer.

Even as the OCAW was receiving these knocks, it was considering new goals. One of these: The possibility of launching a drive to gain **administrative control over fringe-benefit funds.**

The refiners, a Journal survey of construction showed, were adding little to basic crude capacity. Instead they are concentrating on programs which will retire old units and produce improved products. **Crude capacity was at a record 9,789,355 bbl. daily,** but this was only 1.8% gain over previous year.

Three new processes aimed at greater flexibility in producing gasoline from middle distillates were presented to the industry. They are Universal Oil Products' "Lomax," Union Oil of California's "Unicracking," and Standard Oil of California's "Isocracking."

Domestic drilling had the lousiest first quarter in years. Completions were off 1,452 in the January through March period. Operators said the big problem was too much mud in four key areas—Texas, North Louisiana, Oklahoma and Kansas.

At the 6-month mark, the 21,399 completions made were 3,760 fewer than the same period of 1959. States which took the brunt of this cutback were Texas, Oklahoma, and Kansas. The big loss was in development wells.

In the free world outside the U. S. and Canada rotaries were making hole at near-record rates. The boost was primarily a reflection of the high activity in North Africa and the Persian Gulf.

Although domestic drilling rates were down, producers had some technology advances to which they could point with pride. The first quintuple completion was made by Sinclair Oil & Gas Co. It was drilled from a platform in Louisiana offshore waters. Several weeks after this feat, Sunray-Midcontinent completed a six-in-one well in Texas.

The nation's reserves climbed to new highs. Crude-oil reserves were figured at 31,719,347,000 bbl. and natural-gas liquids at 6,522,308,000 bbl. Natural-gas reserves were placed at 262.6 trillion cubic feet.

Offshore leases went better than ever at a sale held by the federal Government. Tracts lying off Louisiana and Texas brought $284.5 million—**more than double the amount ever paid at a previous lease sale.**

A disappointing number of bidders raised their hands for leases covering 9,000 acres in the Gubik area of northern Alaska. The winning bids by Hunt Oil Co. and Colorado Oil & Gas Corp. totaled $206,207.

Alaska's biggest oil well came in at Soldatna Creek. The Standard Oil of California-Richfield well was tested at 1,870 bbl. per day on ½-in. choke. Construction on a crude line to link Soldatna and Swanson River fields to new marine-loading facilities at Cook Inlet will be under way soon. The 20-mile 8-in. line—Alaska's first crude line—is to be completed by this time next year.

Northwest Lisbon field in Utah took on the look of a giant.

Canada approved the tapping of its huge natural-gas reserves for export to the United States. The move has touched off big expenditures for gathering and transmission systems, processing plants, and the development of additional gas reserves. The export permits approve the flow of 6,529 billion cubic feet of gas from Alberta fields to the U. S. over periods ranging up to 25 years.

Pipe laying began on Mid-America Pipeline Co.'s 2,300-mile system from Eunice, N. M., to Minneapolis and Madison, Wis. The project is the nation's first major cross-country pipeline built exclusively to transport natural-gas liquids.

Foreign producing areas started the year with a gush. Crude producing areas of the free world, outside the U. S. and Canada, in January topped the **10-million-barrel-daily level for the first time.** Latest figures show production stayed above this record mark for the first 3 months of the year.

New discoveries which could help boost production to new records were made in Libya, and the Persian Gulf.

In Algeria a 24-in. gas line which will run from Hassi R'Mel field to the Mediterranean was started by the French. Eventually the vast gas supplies of the field may go to European markets, but until that day comes, the gas will be used in North Africa.

On the other side of the world, the **largest unitization project yet went into operation in Lake Maracaibo.** The unit operation controls production of an estimated 630 million barrels of primary reserves. The agreement covers production from the Lower Lagunillas reservoir.

Venezuela's new national oil company began operation with almost 350,000 acres of choice semiproved acreage. It is scheduled to drill its first well in the latter half of this year in the Ruiz 3 area of eastern Venezuela.

Canada readies for heavy gas shipments to U. S. markets

Three new refining processes bow in

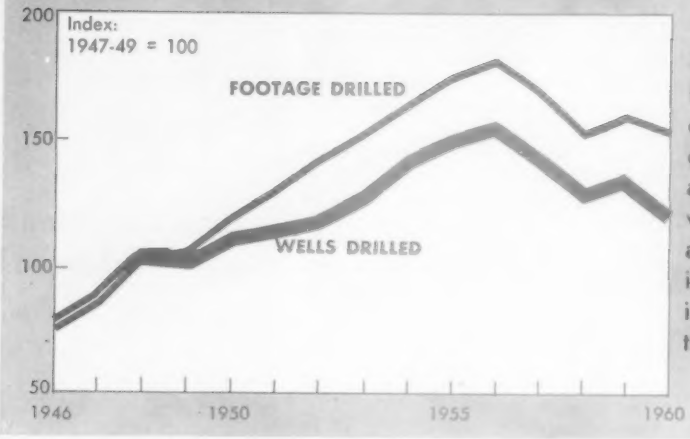
Quintuple and sextuple completions make successful entry

Domestic drilling in doldrums as foreign drilling booms

Downward pull on crude prices get stronger

Percentage completion survives another stiff attack

Wells vs. footage...



Both completions and footage will be down this year, but the footage drop will not be as severe as the cut in number of wells. Operators are drilling a higher percentage of wildcats, which adds to the average well depth. Also, some of the important gains for the year will be in the deeper producing areas of the country.

Second-half drilling will rise 13%

. . . in a gradual recovery from disappointing first half

OPERATORS plan to drill almost 13% more wells in the last half of the year than in the first. However, most of the gain can be credited to the low drilling rate in the first half rather than to any record-setting pace for the last half.

Company reports of actual drilling in the first half and plans for the remainder of the year are the basis for an estimate of 24,095 wells for the last half.

This total represents a gain of 12.8% over actual completions in the first half, but it is under the total for the last half of 1959 by 2,431 wells or 9.2%. The projected total is 5,227 wells short of the all-time drilling record set in the last 6 months of 1956.

Operators' plans for the last half are subject to change. The schedules reported at midyear in many cases may be minimum programs for the period. If conditions change, drilling programs will change.

Wildcat Percentage of Total Drilling

	Wildcat wells	Total wells	Wildcat per cent of total
1957: First half	5,779	25,726	22.46
Last half	5,960	28,112	21.20
1958: First half	4,556	22,988	19.82
Last half	5,032	26,123	19.26
1959: First half	4,517	24,367	18.54
Last half	5,556	26,526	20.95
1960: First half	4,709	21,356	22.05
Last half*	5,484	24,095	22.76

*Forecast.

Drilling Forecast for 1960

(First half actual plus last half forecast)

	Wildcat	Field	Total	Thou. ft.
Alabama	5	53	58	600
Arkansas	169	518	687	2,521
California	305	1,150	1,455	7,147
Colorado	326	367	693	3,424
Florida	9		9	94
Illinois	491	1,907	2,398	4,765
Indiana	392	607	999	1,353
Kansas	1,123	2,461	3,584	12,691
Kentucky	255	1,642	1,897	2,658
Louisiana	596	3,176	3,772	30,325
North	297	1,090	1,387	5,458
South	257	1,540	1,797	18,586
Offshore	42	546	588	6,281
Michigan	244	548	792	2,694
Mississippi	269	516	785	7,945
Montana	158	182	340	1,629
Nebraska	358	446	804	4,539
New Mexico	294	1,729	2,023	9,561
New York	39	287	326	526
North Dakota	74	218	292	1,873
Ohio	62	1,026	1,088	2,663
Oklahoma	796	3,300	4,096	17,884
Pennsylvania	26	560	586	1,822
South Dakota	10	11	21	129
Texas	3,442	12,956	16,398	70,582
Dist. 1	434	684	1,118	3,183
Dist. 2	186	564	750	4,999
Dist. 3	269	959	1,228	8,645
Dist. 4	342	849	1,191	6,593
East	279	1,016	1,295	6,008
Dist. 7-B	689	1,723	2,412	6,827
West	730	3,667	4,397	22,046
Dist. 9	446	2,524	2,970	7,504
Dist. 10	67	970	1,037	4,777
Utah	101	165	266	1,490
West Virginia	16	762	778	1,992
Wyoming	471	621	1,092	5,486
Miscellaneous	162	50	212	480
Total U. S.	**10,193**	**35,258**	**45,451**	**196,873**

U.S. operators to drill 24,095 wells in last half

	Forecast last half 1960				Increase over first half 1960			
	Wildcat wells	Field wells	Total wells	Total footage (thou. ft.)	Wildcat wells	Field wells	Total wells	Total footage (thou. ft.)
Alabama	4	27	31	313	3	1	4	26
Alaska	4	8	12	133	1	4	5	48
Arizona	6	14	20	43	−2	14	12	23
Arkansas	90	295	385	1,407	11	72	83	293
California	168	597	765	3,765	31	44	75	383
Colorado	175	205	380	1,877	24	43	67	330
Florida	6	....	6	60	3	....	3	26
Illinois	266	1,140	1,406	2,772	41	373	414	779
Indiana	214	316	530	714	36	25	61	75
Kansas	584	1,350	1,934	6,844	45	239	284	997
Kentucky	164	950	1,114	1,563	73	258	331	468
Louisiana	326	1,726	2,052	16,245	56	276	332	2,165
North	172	620	792	3,115	47	150	197	772
South	130	810	940	9,715	3	80	83	844
Offshore	24	296	320	3,415	6	46	52	549
Michigan	141	290	431	1,469	38	32	70	244
Mississippi	140	283	423	4,285	11	50	61	625
Montana	89	104	193	925	20	26	46	221
Nebraska	200	205	405	2,277	42	−36	6	15
New Mexico	152	940	1,092	5,143	10	151	161	725
West	32	400	432	1,895	3	129	132	581
East	120	540	660	3,248	7	22	29	144
New York	18	150	168	267	−3	13	10	8
North Dakota	39	102	141	899	4	−14	−10	−75
Ohio	35	560	595	1,457	8	94	102	251
Oklahoma	410	1,716	2,126	9,279	24	132	156	674
Pennsylvania	19	256	275	883	12	−48	−36	−56
South Dakota	4	2	6	27	−2	− 7	− 9	−75
Texas	1,828	6,543	8,371	36,060	214	130	344	1,538
Dist. 1	227	340	567	1,617	20	− 4	16	51
Dist. 2	97	276	373	2,488	8	−12	− 4	−23
Dist. 3	152	456	608	4,320	35	−47	−12	− 5
Dist. 4	180	463	643	3,559	18	77	95	525
East (5 and 6)	146	512	658	3,058	13	8	21	108
Dist. 7-B	361	896	1,257	3,558	33	69	102	289
West (7-C and 8)	398	1,855	2,253	11,277	66	43	109	508
Dist. 9	236	1,250	1,486	3,771	26	−24	2	38
Dist. 10	31	495	526	2,412	−5	20	15	47
Utah	56	78	134	751	11	− 9	2	12
West Virginia	12	410	422	1,095	8	58	66	198
Wyoming	261	322	583	2,933	51	23	74	380
Miscellaneous	73	22	95	109	5	20	25	19
Total United States	**5,484**	**18,611**	**24,095**	**103,595**	**775**	**1,964**	**2,739**	**10,317**

. . . and Canadian operators 1,380

Alberta	230	680	910	5,660	26	136	162	1,011
Saskatchewan	73	251	324	1,334	23	57	80	332
Manitoba	12	28	40	91	6	1	7	19
British Columbia	54	48	102	497	10	8	18	87
Northwest Territories	4	....	4	17	−9	....	− 9	−22
Western Canada	**373**	**1,007**	**1,380**	**7,599**	**56**	**202**	**258**	**1,427**

Here are a few factors that contributed to the low rate in the first half and to limited expansion in the last half.

. . **Total petroleum demand** for the first half was up less than 2%. Last-half demand may be up as much as 4% over the 1959 period, but operators will wait to see how much influence this gain will have on crude production.

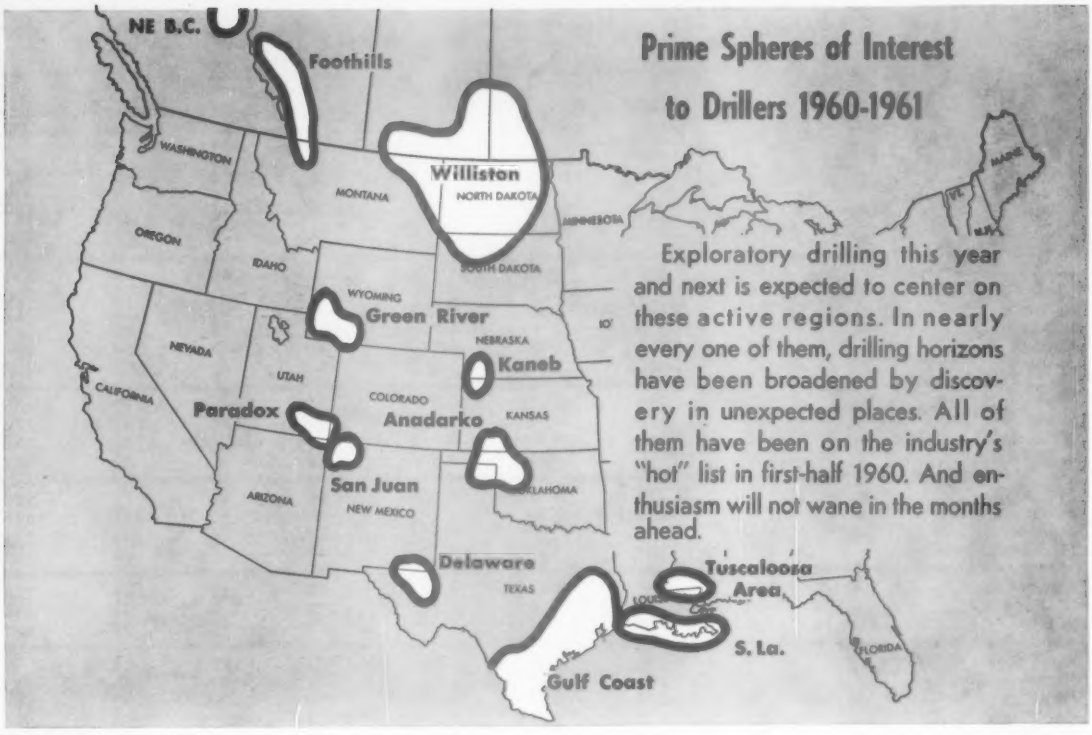
. . . **Crude production** was down 2.1% for the first half. Many operators have to cut drilling when income sags. Important gains in domestic production will be delayed until the fourth quarter.

. . . **High inventories** of both crude and products have lowered prices. Again, this has meant a cut in producer income.

. . . **Wildcat drilling** expanded more than development work, and wildcats are more expensive. The trend will continue in the last half.

. . . **Wells were deeper** in the first half, and costs increase geometrically with depth.

These conditions have tended to limit well completions. Significant changes in any of these factors could produce at least small upward revisions in last-half drilling programs.



Caution tempers oil finder's optimism

IN APPRAISING the outlook for exploration in the months ahead, the usual optimism in this field must be tempered with more than usual caution.

As far as the results of his efforts are concerned, the oil finder has found only lukewarm success in 1960.

The Rocky Mountains continue to command more widespread exploratory interest than any other region in the United States. But other regions are not far behind—these include South Louisiana, Mississippi, the Anadarko basin, and southeastern New Mexico.

Rocky Mountains

There have been a few significant developments in the Rockies since January 1 that will definitely lead to new horizons in exploration.

Paradox basin. The most important discovery of the year in the eyes of most Rocky Mountain observers is that at Lisbon in southeastern Utah's San Juan County. The discovery well, Pure Oil Co. 1 Northwest Lisbon, made headlines in late 1959, but was not officially completed until January 1960. It was the first Devonian producer in this entire basin. With three additional producers on the books and five stepouts now on the active list, Lisbon is shaping up as a major field and seems destined to join the ranks of the giants.

The Lisbon successes indicate that the Paradox basin has a lot more to offer than has been suspected.

Williston basin. Two events in North Dakota and one in northeastern Montana have served notice on Williston operators that there are many new fields to be conquered away from the traditional Nesson anticline arena. These include successful confirmation wells at Rough Rider field in the Badlands of McKenzie County, North Dakota; the first discovery of oil in McHenry County, North Dakota, and confirmation of Montana's Dwyer field in southeastern Sheridan County.

Green River basin. Most active and highly rewarding theater of operations in Wyoming in the first half of 1960 has been Green River, where the Cretaceous section has paid off handsomely at Patrick Draw, West Desert Springs, Playa, and Arch fields.

High success ratios, big potentials, and excellent transportation facilities, coupled with relatively cheap drilling, will spur even more activity in this southwestern Wyoming basin.

San Juan basin. Northwestern New Mexico drilling is at an active clip as operators seek the prolific Gallup oil reservoir and the deeper Dakota gas sands.

But perhaps the most important shift of interest here was triggered by the discovery of Niobrara oil at Gallina on the east side of the San Juan basin. Here, Intex Oil Co. has opened two or three new shallow fields above 2,500 ft. This is only the be-

ginning of a campaign that may eventually lead to a complete encircling of the basin with oil wells.

Kaneb embayment. Southwestern Nebraska and northwestern Kansas in the past 2 years have emerged as an entirely new temptation to the wildcatter. The big campaign was launched in 1958 when Phillips Petroleum Co. discovered Llanos field in Sherman County, Kansas. Since that time, the play has spread northward and eastward into Nebraska's panhandle counties.

Red Willow County has made recent headlines with a Pennsylvanian discovery in 2n-27w. Also, a discovery in 3n-27w, reported as a Cambrian strike, has thrust this county to the forefront of exploration circles. These easternmost discoveries, inching up on the huge Cambridge arch, are bound to stimulate the drilling campaign throughout western Nebraska.

Southeastern States

The southern parishes of **Louisiana** continue to reward the wildcatter with lush new fields and multiplicity of reservoir sands. An important development here is the influx of independent operators banded together as group operations.

Perhaps the most important event of the year for Louisiana was the discovery of oil in the Florida parishes, previously a dry-hole graveyard. Floyd Williams et al. 1 Lake Superior Piling Co. in Tangipahoa Parish found oil in the lower Tuscaloosa-Cretaceous sand and flowed at rates of 27 bbl. per hour. This represented a southward thrust across the state line from Mississippi's booming Cretaceous campaign in Pike and Amite counties.

Meanwhile, **Mississippi** continues to hold the spotlight of southeastern exploration as operators there brought in one new field after another from the Lower Tuscaloosa section.

Look for this Mississippi play to move consistently westward into Wilkinson County and across the Louisiana line, as mentioned earlier, into the Florida parishes of Louisiana.

Anadarko

The Pennsylvanian and Mississippi play in the western Anadarko basin continues unabated and probably will for several more years. A high success ratio (almost unbelievable in some counties) has stimulated the play. Most interesting in this respect is Oklahoma's Kingfisher County, where, in first-half 1960, drillers came up with a 100% development drilling success and 80½% wildcat success.

There is little doubt that the panhandles of Texas and Oklahoma and southwest Kansas will continue to account for hundreds of new wildcats in the months ahead.

Far Southwest

The Delaware basin has taken on new glamor for the wildcatter as new reservoir targets take center stage.

The big lure is the Abo reef, a highly rewarding reservoir that has emerged only in the past 2 years. The shift of interest is emphasized by the statistical picture, which puts Lea and Eddy county rig counts far ahead of Andrews County, Tex., formerly the champion among rig magnets in this region.

Reserves of 10,000 bbl. per acre are considered conservative for Abo reef.

Another temptation in the Delaware region is the Pennsylvanian section at depths of 9,000 to 11,000 ft. There has been a definite westward movement to the west flank of Delaware basin in search of these deep reservoirs, and the activity has moved southward into Texas.

Gulf Coast and East Texas

There's no likelihood of a letup in the constant search for new pools and fields in the Texas Gulf Coast and the East Texas embayment. The emphasis in both regions is on gas and condensate reserves. And some rich new pools are being found in the Smackover - Jurassic, Wilcox - Eocene, and Frio-Oligocene sands.

In East Texas, the accent today is on depth. The deeply buried Jurassic and Lower Cretaceous rocks have paid off along an arc stretching from the Louisiana border west and southwestward to Mexia. There's still lots of room to play, as wide barren gaps separate those few fields that have been found.

Gulf Coast operators never lose interest in new prospects on old structures, nor in the hunt for new provinces. This region continues to account for a large hunk of total Texas drilling. There is a concentrated campaign for the rich gas-condensate pools of Frio and Wilcox age at depths ranging from 5,000 to 13,000 ft. Hottest center lately has been near the Louisiana border in Jefferson County, and the play recently moved out into the waters of Sabine Lake, which separates the two states.

Farther inland, Southwest Texas wildcatters are playing the Deep Edwards trend to the very hilt. This belt of deep Lower Cretaceous lime fields extends from the Rio Grande on the southwest to Lavaca County on the northeast. Like the Smackover trend, there are great gaps between the fields found so far, and lots of drillable prospects lie within these gaps. Consequently, watch for accelerated drilling all along the line.

Canada

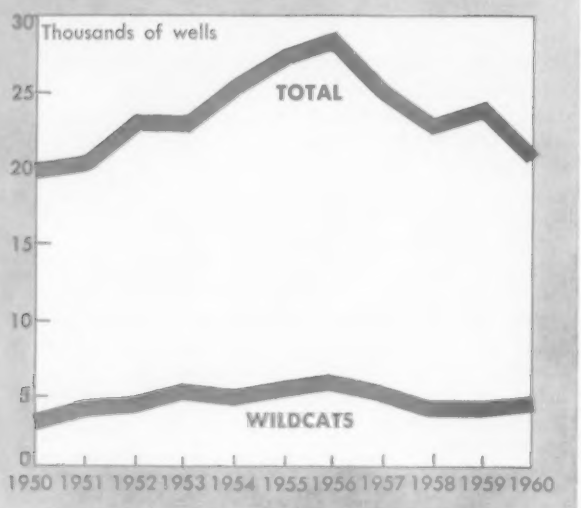
Canadian wildcatters, encouraged by the prospects of future gas exports, are expected to sink a record number of wells in the next few years. Once the needed approvals are granted and pipeline facilities are available, gas will be a golden prize instead of the bottled-up commodity it is today.

Two of the richest sources of gas reserves for this Canadian boom-to-come are the Foothills belt of southwestern Alberta, and the northeast corner of British Columbia. Both have been busy theaters of operation for the past several years, but this activity may well be dwarfed in the years ahead.

A selective future

Over-all, the portrait of the future in exploration is painted in colors neither hot nor cold. A temperate program of exploratory drilling based on more selective locations is in the cards.

Total well tally sags– wildcats edge ahead.



Wells drop 3,000, footage 7,000,000

THE FORWARD MARCH of total well completions noted during the first half of 1959 failed to repeat itself this year. Total well completions during the first 6 months of 1960 could climb only to 21,356, compared to 24,367 at the same date last year. The total well footage likewise showed a loss from 100,588,709 ft. to 93,278,096 ft.

On the brighter side of the ledger, wildcat completions eked out a slight gain over 1959's first-half score. Explorers came up with 4,708 wildcat completions. Of this total there were 417 new oil fields, 50 condensate discoveries, 151 gas finds, and 4,090 unsuccessful exploratory attempts.

The heartening gain in exploratory activity was accompanied by successful and significant wildcatting throughout the country's many oil provinces and in western Canada. This new decade of exploration seems destined to surpass the daring '50's from the bold-drilling standpoint. Despite the continued trend of more exacting exploration, wildcatters are increasing their inquisitiveness in the untested and sparsely tested basins and provinces of the continent. This exploratory push is not just continental, however. There is a determined exploration program under way throughout the free world. North Africa, France, Canada, Mexico, and South America are all in the big drilling picture.

The Pacemakers

A quintet of North American oil and gas provinces made up the exploratory news for the first half . . . the Rockies, Delaware basin, Anadarko basin, the eastern states, and the Northwest Territories.

1. Rockies.

Northwest Lisbon. This was last year's most important discovery anywhere on the oil scene. This field now looms as one of the majors for the Rockies. Late in June the fourth good well for this San Juan County, Utah, candidate for the giants came in. Elliott Production Co. 1-C Lisbon Valley flowed 272 bbl. of oil daily from Mississippian. Pure Oil Co.'s 1 Northwest Lisbon, discovery well, is a Devonian oil producer. Other wells are the Pure 1-C USA, and Pure 1-B USA. There are six other stepouts working. About 15 miles southeast at Southeast Lisbon, Pure has two indicated producers and a third well going down. The entire Lisbon Valley anticline may well become one of the nation's most important oil and gas finds since Aneth.

Sweetwater County. This southwestern Wyoming county is one of the most promising and successful oil and gas-hunting grounds in the business. Seven units and one named area, West Desert Springs, comprise this fast-growing area in the eastern portion of Green River basin. This oil and gas giant lies on the Wamsutter arch with a thick section of Mesaverde Cretaceous sands awaiting the drill. These sands were practically unknown to Wyoming producing circles until Desert Springs field was opened 2 years ago. Now the Almond sand-Mesaverde is one of the most sought-after pays in the Rockies. The big play now is in the Patrick Draw and Arch Units. Patrick Draw-Arch, now connected, has 20 oil producers and a couple of gassers. The area's producing limits remain undefined.

Where wells were completed in first half

	Total	Crude	Cond.	Gas	Dry	Service	Footage	Total Jan.-June 1959
Alabama	27	26	0	0	1	0	286,592	47
Alaska	7	3	0	1	3	0	84,565	4
Arizona	8	0	0	0	8	0	20,032	7
Arkansas	302	138	1	17	142	4	1,113,820	407
California	690	448	0	45	186	11	3,382,262	743
Colorado	313	66	2	37	208	0	1,547,564	366
Florida	3	0	0	0	3	0	33,807	3
Illinois	992	351	0	5	514	122	1,993,084	1,027
Indiana	469	161	0	6	299	3	639,175	386
Iowa	2	0	0	0	2	0	2,007	0
Kansas	1,650	753	1	61	799	36	5,847,327	1,959
Kentucky	783	379	0	111	280	13	1,094,578	1,273
Louisiana	1,720	745	167	114	688	6	14,079,902	1,736
North	595	252	0	85	258	0	2,342,957	635
South	857	358	132	25	337	5	8,871,458	918
Offshore	268	135	35	4	93	1	2,865,487	183
Michigan	361	159	0	8	171	23	1,225,000	305
Mississippi	362	175	16	5	165	1	3,660,278	312
Missouri	22	3	0	0	19	0	28,372	1
Montana	147	60	0	2	85	0	703,600	148
Nebraska	399	129	0	1	269	0	2,261,954	397
Nevada	2	0	0	0	2	0	7,902	1
New Mexico	931	541	36	138	212	4	4,418,664	908
West	300	104	26	132	36	2	1,314,349	407
East	631	437	10	6	176	2	3,104,315	501
New York	158	78	0	10	26	44	258,854	129
North Dakota	151	91	1	0	59	0	974,290	256
Ohio	493	195	0	121	152	25	1,205,917	462
Oklahoma	1,970	942	45	211	728	44	8,604,629	2,877
Oregon	3	0	0	0	3	0	10,806	1
Pennsylvania	311	96	0	117	37	61	939,247	311
South Dakota	15	6	0	0	9	0	101,951	6
Tennessee	40	5	0	0	35	0	32,576	21
Texas	8,027	4,179	388	332	2,934	194	34,521,672	9,305
District 1	551	255	10	21	261	4	1,566,511	551
District 2	377	97	64	59	156	1	2,511,323	401
District 3	620	242	75	23	279	1	4,324,666	555
District 4	548	118	94	52	282	2	3,033,622	651
East	637	348	34	2	247	6	2,949,850	530
District 7-B	1,155	524	14	42	556	19	3,268,783	1,296
West	2,144	1,517	42	28	524	33	10,768,684	2,902
District 9	1,484	795	17	26	526	120	3,733,311	1,760
District 10	511	283	38	79	103	8	2,364,922	659
Utah	132	68	0	15	49	0	738,938	172
Washington	1	0	0	0	1	0	8,520	1
West Virginia	356	18	0	275	45	18	897,517	357
Wyoming	509	228	1	25	252	3	2,552,694	427
Total 6 mos. 1960	**21,356**	**10,043**	**658**	**1,657**	**8,386**	**612**	**93,278,096**	
Total 6 mos. 1959	**24,367**	**12,399**	**602**	**1,773**	**8,972**	**621**	**100,588,709**	***24,367**

*Incl. Va. 11.

Canada's western provinces—and Ontario

Western Canada	1,122	674	0	122	324	2	6,172,346	1,216
Alberta	748	441	0	102	203	2	4,649,446	706
Saskatchewan	244	175	0	7	62	0	1,002,303	436
Manitoba	33	25	0	0	8	0	71,929	19
British Columbia	84	33	0	12	39	0	409,521	51
Northwest Territories	13	0	0	1	12	0	39,147	4
Ontario	127	18	0	39	56	14	203,946	102

Powder River. Another busy Rocky Mountain corner is the northeastern part of Powder River basin in Wyoming. Most of the drilling punch here is in Crook and Campbell counties where operators are building up a big reserve of Cretaceous and Pennsylvanian oil.

2. Delaware basin.

Far western Texas' Delaware basin has enjoyed its most significant drilling escapade in its long and sometimes disappointing history. This basin has been the scene of "biggest," "deepest," "most prolific," drilling news since Mobil 1 Moore in Pecos County flowed 102,000 M.c.f.d. and 1,500 bbl. of condensate per day at 15,147 ft. in the Pennsylvanian. This well became the first Pennsylvanian producer in the Texas portion of the basin. It was for a time the deepest producer in West Texas. Then Atlantic Refining Co. drilled 1 Kelly in the same county, coming up with gas in the Montoya Ordovician at 16,680 ft. Completion will make it Texas' deepest producer. Companion success to the northwest in New Mexico's Eddy and Lea counties points up Delaware as a favored oil playground.

3. Anadarko basin.

This five-state basin continues to be the most successful oil and gas province in the nation. High-success drilling in both field work and wildcatting has been the story here. There are robust drilling programs in Permian and pre-Permian rocks throughout the basin. The Oklahoma and Texas panhandles are showing signs of eventual complete linkup in pre-Permian production. Northwestern Oklahoma counties outside the Hugoton area are all gaining new oil and gas fields in the many sands of the Pennsylvanian and Mississippian sections. One county, Kingfisher, on the extreme eastern side of Anadarko basin, has a booming 100% success ratio in development drilling, and a near 90% in wildcatting so far this year.

4. Eastern states.

In the short space of 2½ years, southern Michigan has emerged as one of the top attractions for those seeking oil. Early in 1957 there was no production in the area at all. Now there are more than 160 oil wells along a 22-mile northwest-southeast trend producing an average of 115-125 bbl. of oil per day from Trenton-Black River Ordovocian at 4,000-5,000 ft. The so-called Albion-Pulaski-Scipio trend has more than brought Michigan back but fast onto the oil scene.

Other eastern areas are enjoying high success. A trend towards deeper drilling throughout the Appalachian province is beginning to show itself in Ohio, West Virginia, and Pennsylvania. Every state east of the Mississippi except Illinois reports good drilling increases over previous years.

5. Northwestern Canada.

Far North exploration came up with Canada's most significant strike of the period at Celibeta Lake. Home Oil Co. et al. found 6,000 M.c.f.d. in Slave Point Devonian at the wildcat which is 30 miles north of the Petitot River giant of British Columbia. It opens the third producing area in the Northwest Territories and the fourth in the entire near-Arctic regions of Canada . . . the others being Norman Wells, Rabbit Lake, and Eagle Plains in the Yukon.

First half completions by type of wells

	Jan.	Feb.	Mar.	Apr.	May	June	6 Mos.
Wildcats							
Oil	78	74	63	51	72	79	417
Cond.	12	8	7	10	9	9	50
Gas	27	25	18	24	32	25	151
Dry	834	564	676	563	614	839	4,090
Total	951	666	764	648	727	952	4,708
Developments							
Oil	1,893	1,319	1,614	1,352	1,566	1,882	9,626
Cond.	149	68	111	89	86	105	608
Gas	320	268	245	216	210	247	1,506
Dry	776	627	696	640	669	887	4,295
Service	134	114	76	98	84	106	612
Total	3,272	2,396	2,742	2,395	2,615	3,227	16,647
Total Wells							
Oil	1,971	1,393	1,677	1,403	1,638	1,961	10,043
Cond.	161	71	118	99	95	114	658
Gas	347	293	263	240	242	272	1,657
Dry	1,610	1,191	1,372	1,203	1,283	1,726	8,385
Service	134	114	76	98	84	106	612
Total	4,223	3,062	3,506	3,043	3,342	4,179	21,355

. . . and footage—by months

Wildcat	4,356,022	2,990,006	3,537,801	3,094,688	3,461,168	4,405,631	21,845,316
Development	14,006,621	9,785,794	12,427,022	10,574,279	11,033,945	13,605,119	71,432,780
Total	18,362,643	12,775,800	15,964,823	13,668,967	14,495,113	18,010,750	93,278,096

First-half completions—field wells . . . and wildcats

	Field-well completions							Wildcat wells					
	Total	Crude	Cond.	Gas	Dry	Service	Footage	Total	Crude	Cond.	Gas	Dry	Footage
Alabama	26	26	0	0	0	0	283,946	1	0	0	0	1	2,646
Alaska	4	2	0	1	1	0	46,536	3	1	0	0	2	38,029
Arizona	....	....	....	....	....	....	.....	8	0	0	0	8	20,032
Arkansas	223	128	0	13	78	4	805,060	79	10	1	4	64	308,760
California	553	440	0	36	66	11	2,619,785	137	8	0	9	120	762,477
Colorado	162	56	2	26	78	0	786,142	151	10	0	11	130	761,422
Florida	....	....	....	....	....	....	.....	3	0	0	0	3	33,807
Illinois	767	336	0	4	305	122	1,591,290	225	15	0	1	209	401,794
Indiana	291	148	0	3	137	3	414,986	178	13	0	3	162	224,189
Iowa	....	....	....	....	....	....	.....	2	0	0	0	2	2,007
Kansas	1,111	671	1	54	349	36	3,854,619	539	82	0	7	450	1,992,708
Kentucky	692	363	0	109	207	13	957,422	91	16	0	2	73	137,156
Louisiana	1,450	730	163	101	450	6	11,690,656	270	15	4	13	238	2,389,246
North	470	244	0	76	150	0	1,695,987	125	8	0	9	108	646,970
South	730	351	128	21	225	5	7,360,521	127	7	4	4	112	1,510,937
Offshore	250	135	35	4	75	1	2,634,148	18	0	0	0	18	231,339
Michigan	258	151	0	6	78	23	847,873	103	8	0	2	93	377,127
Mississippi	233	160	16	4	52	1	2,384,062	129	15	0	1	113	2,276,216
Missouri	....	....	....	....	....	....	.....	22	3	0	0	19	28,372
Montana	78	54	0	1	23	0	416,691	69	6	0	1	62	286,909
Nebraska	241	111	0	1	129	0	1,411,924	158	18	0	0	140	850,030
Nevada	....	....	....	....	....	....	.....	2	0	0	0	2	7,902
New Mexico	789	526	34	136	89	4	3,723,640	142	15	2	2	123	695,024
West	271	99	26	132	12	2	1,196,576	29	5	0	0	24	117,773
East	518	427	8	4	77	2	2,527,064	113	10	2	2	99	577,251
New York	137	78	0	4	11	44	190,667	21	0	0	6	15	68,187
North Dakota	116	86	1	0	29	0	795,837	35	5	0	0	30	178,453
Ohio	466	193	0	116	132	25	1,115,849	27	2	0	5	20	90,068
Oklahoma	1,584	878	36	175	451	44	6,629,302	386	64	9	36	277	1,975,327
Oregon	....	....	....	....	....	....	.....	3	0	0	0	3	10,806
Pennsylvania	304	96	0	114	33	61	890,066	7	0	0	3	4	49,181
South Dakota	9	6	0	0	3	0	77,103	6	0	0	0	6	24,848
Tennessee	2	2	0	0	0	0	809	38	3	0	0	35	31,767
Texas	6,413	4,097	355	296	1,471	194	27,107,870	1,614	82	33	36	1,463	7,413,802
District 1	344	251	10	20	59	4	928,939	207	4	0	1	202	637,572
District 2	288	95	56	56	80	1	1,893,251	89	2	8	3	76	618,072
District 3	503	239	68	22	173	1	3,306,127	117	3	7	1	106	1,018,539
District 4	386	114	85	44	141	2	2,132,682	162	4	9	8	141	900,940
East	504	345	30	2	121	6	2,203,233	133	3	4	0	126	746,617
District 7-B	827	501	13	25	269	19	2,285,602	328	23	1	17	287	983,181
West	1,812	1,495	38	25	221	33	9,316,183	332	22	4	3	303	1,452,501
District 9	1,274	775	17	25	337	120	2,969,486	210	20	0	1	189	763,825
District 10	475	282	38	77	70	8	2,072,367	36	1	0	2	33	292,555
Utah	87	64	0	10	13	0	482,213	45	4	0	5	36	256,725
Washington	....	....	....	....	....	....	.....	1	0	0	0	1	8,520
West Virginia	352	18	0	273	43	18	870,459	4	0	0	2	2	27,058
Wyoming	299	206	0	23	67	3	1,437,973	210	22	1	2	185	1,114,721
Six mos. 1960	**16,647**	**9,626**	**608**	**1,506**	**4,295**	**612**	**71,432,780**	**4,708**	**417**	**50**	**151**	**4,090**	**21,845,316**
Six mos. 1959	**19,850**	**11,949**	**539**	**1,638**	**5,103**	**621**	**78,308,705**	**4,517**	**450**	**63**	**135**	**3,869**	**22,280,004**

. . . and Canadian completions

West. Canada	805	638	0	74	91	2	4,420,132	317	36	0	48	233	1,572,214
Alberta	544	417	0	65	60	2	3,407,171	204	24	0	37	143	1,242,275
Saskatchewan	194	170	0	4	20	0	774,069	50	5	0	3	42	228,234
Manitoba	27	25	0	0	2	0	55,172	6	0	0	0	6	16,757
B. C.	40	26	0	5	9	0	183,720	44	7	0	7	30	225,801
N. W. T.	0	0	0	0	0	0	.....	13	0	0	1	12	39,147
Ontario	127	18	0	39	56	14	203,946	0	0	0	0	0	0

First-half footage—development . . . and wildcat wells

	Oil	Cond.	Gas	Dry	Service	Oil	Cond.	Gas	Dry
Alabama	283,946								2,646
Alaska	22,733		12,029	11,774		11,315			26,714
Arizona									20,032
Arkansas	422,175		64,769	309,660	8,456	43,455	11,365	16,488	237,452
California	2,040,435		190,381	341,687	47,282	60,469		51,489	650,519
Colorado	277,072	11,669	142,198	355,203		49,751		63,721	647,950
Florida									33,807
Illinois	779,936		5,546	602,661	203,147	36,493		373	364,928
Indiana	234,458		1,681	174,892	3,955	17,008		4,451	202,730
Iowa									2,007
Kansas	2,212,933	5,402	254,323	1,269,342	112,619	307,262		28,369	1,657,077
Kentucky	329,867		312,771	297,540	17,244	24,656		6,628	105,872
Louisiana	5,388,886	1,995,395	571,669	3,713,502	21,204	123,327	54,950	121,443	2,089,526
North	704,869		331,246	659,872		43,661		71,595	531,714
South	3,329,181	1,574,495	187,878	2,251,328	17,639	79,666	54,950	49,848	1,326,473
Offshore	1,354,826	420,900	52,545	802,302	3,565				231,339
Michigan	526,988		19,427	267,255	34,203	32,397		9,987	334,743
Mississippi	1,682,357	166,143	34,225	491,667	9,670	128,563		13,891	1,333,762
Missouri						3,724			24,648
Montana	318,559		2,853	95,279		34,937		1,959	250,013
Nebraska	619,900		5,275	786,749		107,667			742,363
Nevada									7,902
New Mexico	2,423,362	248,402	643,994	396,397	11,485	78,021	27,157	17,679	572,167
West	357,423	168,956	630,109	34,970	5,118	24,793			92,980
East	2,065,939	79,446	13,885	361,427	6,367	53,228	27,157	17,679	479,187
New York	105,300		9,829	13,388	62,150			25,242	42,945
North Dakota	600,652	11,902		183,283		40,001			138,452
Ohio	485,006		305,842	294,024	30,977	7,462		13,966	68,640
Oklahoma	3,475,427	300,806	1,071,959	1,690,497	90,613	400,205	65,100	223,212	1,286,810
Oregon									10,806
Pennsylvania	158,071		461,134	153,802	117,059			23,069	26,112
South Dakota	51,258			25,845					24,848
Tennessee	809					988			30,779
Texas	16,247,132	3,055,821	1,367,795	5,985,008	452,114	475,514	298,141	152,248	6,487,899
Dist. 1	564,454	86,732	108,996	160,761	7,996	23,663		1,405	612,504
Dist. 2	629,793	470,287	282,551	505,703	4,917	14,082	88,469	11,579	503,942
Dist. 3	1,256,574	709,078	119,323	1,212,793	8,359	30,714	72,696	3,500	911,629
Dist. 4	490,669	705,642	219,306	707,596	9,469	14,438	77,848	47,864	760,790
East	1,405,567	239,231	9,403	539,256	9,776	25,944	30,921		689,752
Dist. 7-B	1,445,865	49,343	81,051	665,305	44,038	82,535	4,393	57,539	838,714
West	7,607,089	393,660	127,174	1,086,508	101,752	174,482	23,814	8,095	1,246,110
Dist. 9	1,703,146	97,191	142,217	780,197	246,735	101,176		3,890	658,759
Dist. 10	1,143,975	304,657	277,774	326,889	19,072	8,480		18,376	265,699
Utah	365,677		59,395	57,141		29,020		36,660	191,045
Washington									8,520
West Va.	35,218		686,002	106,001	43,238			13,190	13,868
Wyoming	1,021,485		136,991	265,074	14,423	129,668	11,265	9,500	964,288
Total U. S.	40,109,642	5,795,540	6,360,088	17,887,671	1,279,839	2,141,903	467,978	833,565	18,401,870

. . . and in Canada

West. Canada	3,575,473		348,088	486,677	9,894	215,070		290,026	1,247,118
Alberta	2,725,535		313,846	357,896	9,894	168,568		231,863	841,844
Sask.	688,661		9,419	75,989		18,754		13,083	196,397
Manitoba	50,916			4,256					16,757
B. C.	110,361		24,823	48,536		27,748		40,965	157,088
N. W. T.								4,115	35,032

Depth breakdown of field wells—U.S. and Canada—in first half

	OIL									GAS									DRY								
	A	B	C	D	E	F	G	H	I	A	B	C	D	E	F	G	H	I	A	B	C	D	E	F	G	H	I
Alabama	...	...	2	...	...	...	24	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
Alaska	...	...	...	...	...	...	2	...	...	...	...	...	...	...	...	1	...	...	...	...	...	...	...	...	1	...	...
Arkansas	3	35	68	7	13	1	1	...	...	...	1	2	3	7	...	...	...	...	1	4	49	13	6	2	3	...	...
California	71	101	59	69	68	31	27	14	...	1	2	6	5	20	1	...	...	1	6	3	16	14	14	8	4	1	...
Colorado	...	3	8	16	29	...	...	...	...	...	1	1	6	17	1	...	...	...	4	4	17	19	33	1	...	...	...
Illinois	27	154	150	3	2	...	...	...	...	2	1	1	...	...	...	...	...	...	76	102	117	5	5	...	...	...	...
Indiana	60	62	26	...	...	...	...	...	...	3	...	...	...	...	...	...	...	...	80	51	6	...	...	...	...	...	...
Kansas	1	163	316	169	22	...	...	...	...	...	3	10	16	25	...	...	...	...	...	42	156	122	29	...	...	...	...
Kentucky	266	87	10	...	...	...	...	...	...	13	27	42	27	...	...	...	...	...	89	99	19	...	...	...	...	...	...
Louisiana	30	120	60	26	104	158	142	63	27	10	25	14	6	7	21	12	5	1	8	30	64	26	58	72	119	55	18
North	29	110	37	20	42	6	...	...	...	9	25	11	5	6	18	2	...	...	6	23	52	16	31	16	5	1	...
South	1	10	23	6	45	107	85	51	23	1	...	3	1	1	3	8	4	...	2	7	11	8	19	46	79	38	15
Offshore	...	...	...	...	17	45	57	12	4	...	...	...	...	...	...	2	1	1	...	...	1	2	8	10	35	16	3
Michigan	...	38	10	103	...	...	...	...	...	...	1	3	2	...	...	...	...	...	3	16	14	45	...	...	...	...	...
Mississippi	...	...	...	10	5	8	129	8	...	...	...	...	2	...	1	...	...	1	...	...	1	3	10	10	23	5	...
Montana	...	4	14	5	10	21	...	...	...	...	...	1	...	...	...	...	...	...	2	3	2	9	6	1	...	...	...
Nebraska	...	...	15	17	79	...	...	...	...	...	...	...	...	1	...	...	...	...	1	...	...	15	113	...	...	...	...
New Mexico	18	68	113	136	152	24	13	2	...	2	28	32	6	49	19	...	...	...	13	13	20	18	8	10	6	1	...
West	5	38	9	10	36	1	...	...	...	2	28	31	5	48	18	...	...	...	4	2	1	3	2	...	...	...	...
East	13	30	104	126	116	23	13	2	...	...	...	1	1	1	1	...	...	...	9	11	19	15	6	10	6	1	...
New York	...	78	...	...	...	...	...	...	...	...	2	2	...	...	...	...	...	...	...	10	1	...	...	...	...	...	...
North Dakota	...	...	5	22	20	35	3	1	...	...	...	...	...	...	...	...	...	...	...	...	7	4	7	9	2	...	...
Ohio	40	23	122	8	...	...	...	...	...	25	20	61	10	...	...	...	...	...	43	19	59	11	...	...	...	...	...
Oklahoma	89	220	200	132	141	81	14	1	...	6	10	18	19	69	47	4	1	1	54	110	108	56	80	37	5	1	...
Pennsylvania	...	96	...	...	...	...	...	...	...	...	...	66	20	28	...	...	...	...	...	26	...	...	7	...	...	...	...
South Dakota	...	...	...	...	...	6	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	3	...	...	...
Tennessee	2	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
Texas	557	776	929	739	637	357	79	23	...	4	61	74	41	78	26	12	...	...	214	336	258	215	223	157	54	9	5
Dist. 1	26	145	51	24	4	...	1	...	...	...	3	8	2	1	...	6	...	...	13	20	16	3	2	4	1	...	...
Dist. 2	1	2	5	18	43	13	13	...	...	1	1	12	16	21	4	1	...	...	1	6	9	7	26	28	3	...	...
Dist. 3	16	34	34	40	55	47	12	1	...	...	1	2	6	10	3	...	...	...	15	15	15	7	37	45	29	6	4
Dist. 4	11	25	19	12	38	8	1	...	...	1	6	16	4	8	6	3	...	...	13	19	19	17	46	21	5	1	...
East	81	36	54	70	41	61	2	...	...	...	1	...	...	...	1	...	...	...	26	11	13	24	23	19	5	...	...
Dist. 7-B	111	119	88	141	42	...	...	...	...	2	9	3	7	4	...	...	...	...	70	71	47	68	13	...	...	...	...
West	33	138	372	367	329	186	48	22	...	...	2	8	5	6	2	2	...	...	9	34	37	50	49	28	11	2	1
Dist. 9	278	253	106	67	69	2	...	...	...	...	2	...	...	23	...	...	...	...	67	150	67	37	15	1	...	...	...
Dist. 10	...	24	200	...	16	40	2	...	...	...	36	25	1	5	10	...	...	...	...	10	35	2	12	11	...	...	...
Utah	...	...	...	...	64	...	...	...	...	1	...	...	...	8	1	...	...	...	2	1	1	...	9	...	...	...	...
West Virginia	...	18	...	...	...	...	...	...	...	5	162	57	45	4	...	...	...	...	...	31	7	4	1	...	...	...	...
Wyoming	19	8	33	29	113	3	1	...	...	...	1	4	3	8	7	...	...	...	15	7	14	7	21	...	2	...	1
Total United States	**1,183**	**2,054**	**2,140**	**1,491**	**1,459**	**725**	**435**	**112**	**27**	**72**	**345**	**394**	**211**	**321**	**124**	**29**	**6**	**4**	**611**	**907**	**936**	**586**	**630**	**310**	**219**	**72**	**24**
Western Canada	...	38	98	394	28	76	4	...	...	1	18	7	3	23	20	1	1	...	...	7	25	*24	*22	13	...	...	...
Alberta	...	1	4	325	27	56	4	...	...	1	14	7	3	18	20	1	1	...	...	2	24	8	17	9	...	...	...
Saskatchewan	...	12	94	63	1	...	...	...	...	...	4	...	...	...	...	...	...	...	...	4	...	16	...	...	...	...	...
Manitoba	...	25	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	1	1	...	...	...	...	...	...
British Columbia	...	...	...	6	...	20	...	...	...	...	...	...	...	5	...	...	...	...	...	...	...	...	5	4	...	...	...

*Two service wells.

NOTE: A = 0-1,250 ft.; B = 1,250-2,500 ft.; C = 2,500-3,700 ft.; D = 3,750-5,000 ft.; E = 5,000-7,500 ft.; F = 7,500-10,000 ft.; G = 10,000-12,500 ft.; H = 12,500-15,000 ft.; I = 15,000 ft.

Depth breakdown of wildcat wells—first half 1960

	OIL									GAS									DRY								
	A	B	C	D	E	F	G	H	I	A	B	C	D	E	F	G	H	I	A	B	C	D	E	F	G	H	I
Alabama																					1						
Alaska							1																		1	1	
Arizona																			4	1		1	2				
Arkansas		1	8		1						1		2	1					6	6	27	13	6	4	2		
California		1		1	1	4	1			1		1		4	3				7	18	13	19	35	18	5	5	
Colorado		1	2	2	4	1						3	2	2	4				8	3	8	23	83	4	1		
Florida																							1		1		1
Illinois	1	6	8							1									78	65	64		2				
Indiana	9	3	1							1	1	1							97	60	5						
Iowa																			1	1							
Kansas		8	33	34	7						2		5						4	66	175	150	55				
Kentucky	8	3	5							1				1					26	43	4						
Louisiana			2	2	3	2	4	2				2		2	2	5	1	1	2	10	22	24	41	31	55	32	21
North			2	2	3	1						2		1	2	4			2	10	22	24	37	8	4	1	
South						1	4	2						1		1	1	1					4	21	44	26	17
Offshore																								2	7	5	4
Michigan		1		7										2					1	17	28	42	5				
Mississippi			1	4	1	1	8										1					8	24	7	55	18	1
Missouri			3																		19						
Montana			1	2	2		1				1								5	11	14	12	18	2			
Nebraska			1	4	13														2	4	11	27	96				
Nevada																					1		1				
New Mexico	1	4	2	1	3	3	1							1		1			22	19	15	18	26	10	6	7	
West		1	1		3														6	2	3	4	8	1			
East	1	3	1	1		3	1							1		1			16	17	12	14	18	9	6	7	
New York												4		2					2	1	8	2	2				
North Dakota				2		2			1											2	13	8	4	1	1	1	
Ohio			2							1	1	3								5	8	4	3				
Oklahoma	1	4	8	8	24	14	4	1			3	2	6	16	7		2		28	46	50	40	66	33	11	1	2
Oregon																					2		1				
Pennsylvania														1	2								4				
South Dakota																			2	1	1			2			
Tennessee	3																		28	7							
Texas	2	3	16	18	24	10	5	4		4	5	7	10	7	1	1	1		203	280	206	214	316	153	76	13	2
Dist. 1			1		2	1					1								59	52	31	20	26	7	6	1	
Dist. 2					1	1					1		1	1					2	2	6	11	27	18	9		1
Dist. 3						1	2					1							1		6	3	15	50	30	1	
Dist. 4		1	1	1	1							2	1	3	1	1			16	11	22	16	35	25	13	3	
East				1		1		1											6	11	13	21	50	18	4	3	
Dist. 7-B	1	2	11	7	2					3	3	2	6	3					49	88	64	49	37				
West	1		1	2	7	5	3	3		1		1	1						53	56	33	49	79	20	9	3	1
Dist. 9			2	7	11							1							17	60	30	42	37	3			
Dist. 10						1							1				1				1	3	10	12	5	2	
Utah			1			3							1	1	2	1			2	2	5	4	18	2	3		
Washington																								1			
West Virginia														2									2				
Wyoming	2	1	1	4	9	3	2						1	1					20	21	25	8	73	33	4	1	
Total United States	**27**	**36**	**95**	**89**	**92**	**43**	**27**	**7**	**1**	**9**	**14**	**23**	**27**	**43**	**21**	**8**	**5**	**1**	**548**	**689**	**725**	**617**	**884**	**301**	**221**	**79**	**27**
Western Canada		2	2	3	19	10					3	8	3	25	4	5			2	10	79	60	44	34	3	1	
Alberta			1		19	4					2	7	2	17	4	5					42	45	44	8	3	1	
Saskatchewan		2	1	2							1	1		1						1	21	14	5	1			
Manitoba																				5	1						
British Columbia				1		6								7							1		4	25			
Northwest Territories													1						2	4	4	1	1				

NOTE: A = 0-1,250 ft.; B = 1,250-2,500 ft.; C = 2,500-3,700 ft.; D = 3,750-5,000 ft.; E = 5,000-7,500 ft.; F = 7,500-10,000 ft.; G = 10,000-12,500 ft.; H = 12,500-15,000 ft.; I = 15,000 ft.

The regional scene. The Rocky Mountains continue to attract more exploratory interest than any other continental region. Most of the first half's oil and gas finds were in areas off the beaten path and in areas heretofore neglected by the explorer. There is some speculation that Lisbon may link up eventually with Southeast Lisbon 15 miles away in Colorado. If this happens, the Rockies will have added one of the great fields of oil history. The Paradox basin seems destined to contain a lot more oil than before suspected.

The only other production discovered so far, outside the limits of the Four Corners enclave, lies in Grand County, Utah, on the north flank of the basin. Here, discoveries at Big Flat, Cane Creek, and Crescent Junction provide clues to the real potential of this sparsely explored province.

. . . Nebraska. The most important recent development here has been at Ackman field in Red Willow County. This 1959 strike has rapidly grown into a 15-well field with no limits yet established. Production is from Oread and Lansing-Kansas City.

. . . Pacific Northwest. Humble Oil & Refining Co. announced plans for a wildcat in Lake County, Oregon, about 22 miles northwest of Lakeview. This well will bring some much-needed interest to a section of the country that has had its ups and downs in wildcatting for many years. Only one field was ever found in the entire 3-state region.

Humble's try will explore for production beneath the volcanic rocks in the area to a proposed depth of 12,000 ft. The company began leasing actively in this general area in early 1959; it acquired a large block of acreage, part of which will be explored by the new wildcat. Drilling will be by contract rig with operations expected to begin soon. This section of Oregon is 560 miles southeast of Ocean City field, the region's only production. It is 250 miles north of the northern end of California's Sacramento Valley producing areas, and 500 miles northwest of Nevada's one oil field at Railroad Valley. Nearest recent drilling to the Humble well was 2 years ago 130 miles north.

Multiple completions in first half

	Dual	Triple	Quad.	Sextuple
Arkansas	7	...	1	...
California	3	...	...	...
Kansas	12	...	...	...
North Louisiana	7	2	...	...
South Louisiana	87	8	...	...
Louisiana Offshore	35	13	3	...
Mississippi	14	...	...	...
Montana	5	...	...	...
West New Mexico	20	...	...	...
East New Mexico	14	...	...	...
Oklahoma	139	2	...	...
Texas	258	15	...	1
District 1	6	...	...	...
District 2	30	1	...	1
District 3	44	...	...	...
District 4	36	5	...	...
East	31	...	...	...
District 7-B	4	...	...	...
West	71	7	...	...
District 9	18	2	...	...
District 10	18	...	...	...
Wyoming	1	...	...	...
Total U. S.	**602**	**40**	**4**	**1**

Depth breakdown by well types—first half 1960

SERVICE WELLS

	A	B	C	D	E	F	G	H	I
Illinois	24	77	20	1	...	...	...	...	...
Indiana	2	1	...	...	...	...	...	...	...
Kansas	1	9	13	13	...	...	...	...	...
Kentucky	8	4	1	...	...	...	...	...	...
Louisiana, S.	...	1	3	1	1	...	...	...	...
New York	...	44	...	...	...	...	...	...	...
Ohio	16	2	7	...	...	...	...	...	...
Oklahoma	12	20	7	4	1	...	...	...	...
Pennsylvania	28	33	...	...	...	...	...	...	...
Arkansas	...	4	...	...	...	...	...	...	...
Texas	62	54	43	27	5	3	...	...	...
Dist. 1	1	2	1	...	...	...	...	...	...
Dist. 2	...	...	...	1	...	...	...	...	...
Dist. 3	...	...	...	...	...	1	...	...	...
Dist. 4	...	1	...	...	...	1	...	...	...
East	3	1	2	...	...	...	...	...	...
Dist. 7-B	4	7	4	2	2	...	...	...	...
West	2	4	19	7	...	1	...	...	...
Dist. 9	51	38	11	17	3	...	...	...	...
Dist. 10	1	1	6	...	...	...	...	...	...
Michigan	16	4	...	3	...	...	...	...	...
W. Virginia	...	16	...	1	1	...	...	...	...
California	...	1	4	3	3	...	...	...	...
Wyoming	...	...	...	2	1	...	...	...	...
East N. M.	...	...	2	...	...	...	...	...	...
West N. M.	...	1	1	...	...	...	...	...	...
Mississippi	...	...	...	...	...	1	...	...	...
Total U. S.	169	271	101	55	12	4	...	...	...

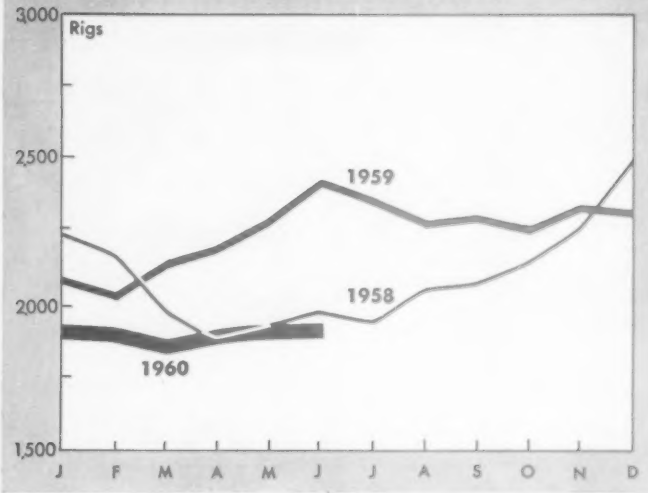
WILDCAT CONDENSATE

	A	B	C	D	E	F	G	H	I
Louisiana	...	...	...	...	...	...	1	2	1
South	...	...	...	...	...	...	1	2	1
Offshore	...	...	...	...	...	...	...	...	...
Oklahoma	...	...	...	...	5	4	...	...	...
Arkansas	...	...	...	...	...	...	1	...	...
Texas	...	2	...	1	8	5	14	2	1
Dist. 1	...	...	...	...	...	...	...	...	...
Dist. 2	...	...	...	...	1	1	4	2	...
Dist. 3	...	...	...	...	1	...	6	...	...
Dist. 4	...	...	...	...	3	3	3	...	...
East	...	...	...	...	2	1	1	...	...
Dist. 7-B	...	...	...	1	...	...	...	...	...
West	...	2	...	...	1	...	...	...	1
Dist. 9	...	...	...	...	...	...	...	...	...
Dist. 10	...	...	...	...	...	...	...	...	...
Wyoming	...	...	...	...	...	...	1	...	...
East N. M.	...	...	...	...	...	...	1	1	...
Total U. S.	...	2	...	1	13	9	18	5	2

FIELD CONDENSATE

	A	B	C	D	E	F	G	H	I
Kansas	...	...	...	...	1	...	...	...	...
Colorado	...	...	...	...	2	...	...	...	...
Louisiana	1	...	...	...	...	19	68	55	20
South	1	...	...	...	...	12	55	45	15
Offshore	...	...	...	...	...	7	13	10	5
Mississippi	...	...	...	2	...	6	5	3	...
East N. M.	...	...	...	...	2	3	1	2	...
West N. W.	...	...	...	...	25	1	...	...	...
Oklahoma	...	...	...	1	11	15	8	1	...
North Dakota	...	...	...	...	...	...	1	...	...
Texas	...	1	7	13	98	130	93	11	2
Dist. 1	...	...	1	...	...	5	4	...	...
Dist. 2	...	...	...	1	20	27	7	...	1
Dist. 3	...	...	1	...	5	17	36	8	1
Dist. 4	...	...	...	1	30	37	16	1	...
East	...	...	...	1	12	14	2	1	...
Dist. 7-B	...	1	3	7	2	...	...	...	...
West	...	...	...	1	4	4	28	1	...
Dist. 9	...	...	1	1	15	...	...	...	...
Dist. 10	...	...	1	1	10	26	...	...	...
Total U. S.	1	1	7	16	139	174	176	72	22

Average Number of Rotary Rigs Operating in U. S. and Canada



Active rotary rigs decline to lowest number since 1947.

Average number of rigs running first 6 months of 1960 falls 270 under 1959 total for same period, and 103 under 1958 level.

Monthly averages range from 42 to 457 rigs below 1959 activity. Peak number drops 359 rigs.

Rotary-rig activity continues its steady downward trend

CONTINUED general slackening of drilling activity in the United States and western Canada this year has cut deeper into the number of rotary rigs needed.

As a result, the number of rigs in operation in the two countries this year has been running on weekly averages all the way from around 50 to above 450 under corresponding periods of 1959.

At midyear, the number of active rigs was down to 1,928, nearly 150 below the year's peak number of 2,077 rigs running January 1.

At one time, late in January, the number dropped to about 1,850, the lowest at any time since 1947. Several other times the number fell well below 1,900 rigs. Average number running during the 6 months was only 1,919, compared with 2,189 during 1959, and 2 022 in 1958.

Rotary-rig activity since 1955

(First 6 months only United States and Canada)

Year	No. rigs* Jan. 1	No. rigs* June 30	Peak No.	Low No.	Avg. No.
1960	2,077	1,928	2,077	1,852	1,919
1959	2,198	2,376	2,436	1,996	2,189
1958	2,373	1,945	2,373	1,895	2,022
1957	2,614	2,796	2,796	2,355	2,479
1956	3,023	2,943	3,062	2,619	2,852
1955†	2,683	2,937	2,937	2,574	2,738

*Based on Hughes Tool Co. weekly average figures. †Record year with 3,338 rigs active at peak in December.

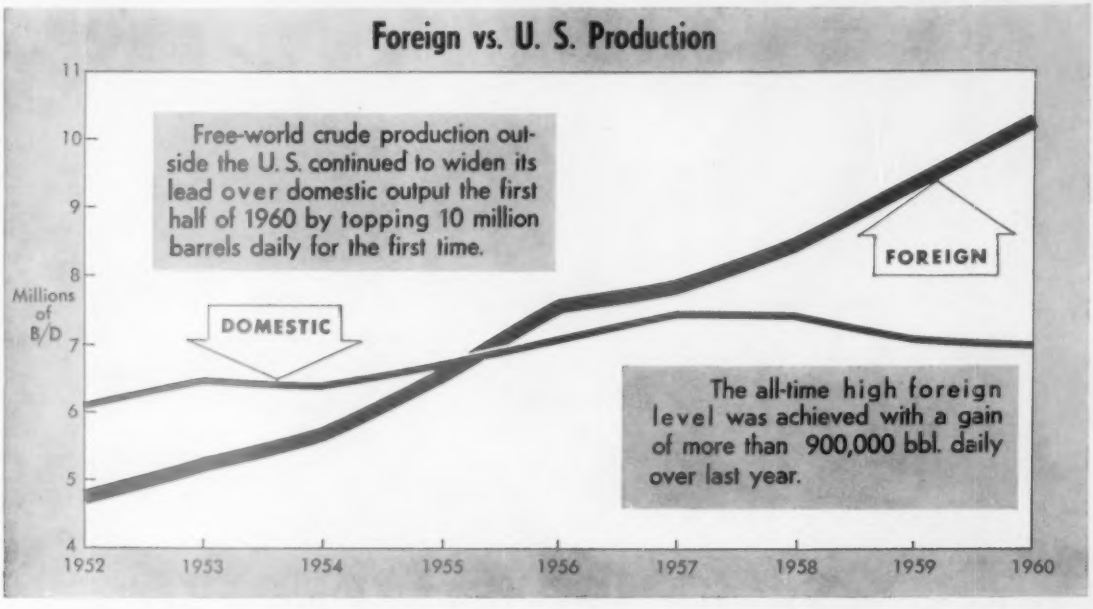
Michigan, Mississippi, Louisiana offshore, and South Texas (mainly Gulf Coast) were the only places where there was any increase in drilling. There, the increases were relatively small.

Rigs in use kept up their high degree of drilling efficiency. They averaged 9.8 wells completed per rig during the 6-month period compared with 9.7 wells per rig during the same time in 1958.

Rotary-rig activity by states

State—	No. rigs* Jan. 1	No. rigs* June 30	Peak No.	Six mos. avg. 1960	Six mos. avg. 1959
Alabama	5	4	5	4	8
Arkansas	14	14	17	13	13
California	78	87	100	82	92
Colorado	39	29	39	26	33
Ill.-Ind.-Ky.	51	52	69	43	45
Kansas	123	120	138	110	134
Louisiana	286	295	304	290	333
North	30	36	44	33	33
South onshore	205	203	225	204	258
Offshore	51	56	59	53	42
Michigan	37	44	47	35	18
Mississippi	68	58	80	65	61
Montana	18	17	22	16	18
Nebraska	24	28	31	23	25
New Mexico	114	114	127	106	109
North Dakota	25	16	24	17	36
Oklahoma	188	192	211	185	223
Pennsylvania-Eastern†	22	24	25	20	19
Texas	662	574	662	610	745
South	183	173	190	175	171
North-Pan.-East	160	162	167	146	157
West Central	218	156	218	189	264
West	101	93	119	100	153
Utah	27	29	32	28	32
Wyoming	64	65	65	57	64
Others‡	9	9	14	9	9
Total U. S.	1,853	1,771	§1,853	1,739	2,017
Canada	224	157	259	180	172
Total	2,077	1,928	§2,077	1,919	2,189

*Based on Hughes Tool Co. weekly figures. †Includes New York, Ohio, and West Virginia. ‡Alaska, Arizona, Florida, Iowa, Missouri, Oregon, South Dakota, and Washington. §From U. S. and Canada weekly totals.



The chart and table tell the story

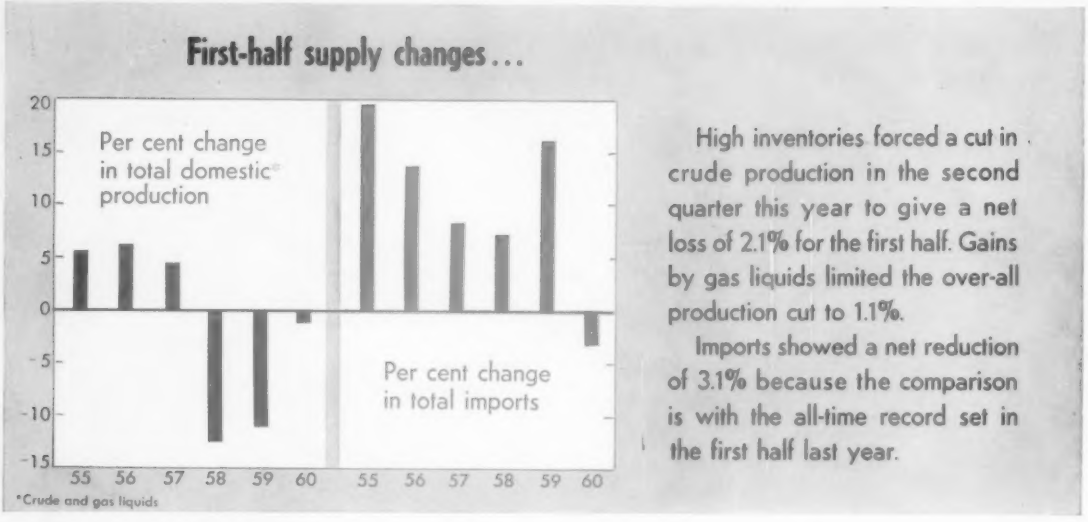
U.S.-foreign production gap widens

World-Wide Crude Production

Daily average in thousands of barrels

Country	First 6 months 1960	First 6 months 1959	Per Cent change	First 6 months 1958
Western Hemisphere				
Argentina	143.1	117.8	21.5	93.5
Bolivia	8.3	8.6	−3.5	9.8
Brazil	76.0	56.9	33.6	45.3
Canada	548.5	499.8	9.7	449.2
Chile	18.9	16.7	13.2	14.5
Colombia	156.6	141.4	10.7	126.1
Cuba	0.4	0.5	−20.0	1.1
Ecuador	7.8	7.8		8.8
Mexico	264.0	265.2	− 0.5	251.4
Peru	52.1	48.0	8.5	50.5
Trinidad	118.5	109.1	8.6	99.7
Venezuela	2,840.0	2,837.2	0.1	2,514.0
Total	**4,234.2**	**4,109.0**	**3.0**	**3,663.9**
Europe				
Austria	45.6	46.6	− 2.1	55.0
France	36.7	29.3	25.3	27.0
West Germany	104.9	99.0	6.0	83.6
Italy	30.0	28.3	6.0	29.4
Netherlands	34.7	33.7	3.0	29.7
United Kingdom	1.7	1.6	6.3	1.7
Yugoslavia	12.3	10.7	15.0	8.6
Total	**265.9**	**249.2**	**6.7**	**235.0**
Middle East				
Bahrain	45.0	44.9	0.2	38.1
Iran	1,000.0	903.7	10.7	809.5
Iraq	925.0	801.6	15.4	662.6
Israel	2.0	2.0		1.2
Kuwait	1,580.0	1,391.7	13.5	1,364.7
Neutral Zone	128.0	111.5	14.8	70.3
Qatar	170.0	169.9	0.1	171.3
Saudi Arabia	1,215.2	1,067.8	13.8	991.3
Turkey	6.9	6.9		6.3
Total	**5,072.1**	**4,500.0**	**12.7**	**4,115.3**

Country	First 6 months 1960	First 6 months 1959	Per Cent change	First 6 months 1958
Other Asia				
British Borneo	110.0	111.2	− 1.1	106.9
Burma	10.5	10.1	3.9	8.1
India	8.5	8.5		8.6
Indonesia	399.0	330.2	20.8	317.9
Japan	9.5	7.3	30.1	7.0
New Guinea	4.1	4.7	−14.6	4.8
Pakistan	5.9	6.0	− 1.7	6.0
Total	**547.5**	**478.0**	**14.5**	**459.3**
Africa				
Algeria	122.4	14.4	850.0	7.2
Angola	1.2	1.2		0.2
Egypt	58.9	59.6	− 1.2	57.9
Gabon	14.4	13.7	5.1	7.7
Morocco	2.1	1.8	16.7	1.5
Nigeria	17.0	7.4	229.7	4.8
Total	**216.0**	**98.1**	**220.2**	**79.3**
Free World				
Foreign	10,335.7	9,434.3	9.6	8,552.8
U. S.	7,042.0	7,154.8	− 1.6	6,464.1
Total	**17,377.7**	**16,589.1**	**4.8**	**15,016.9**
Communist countries in Soviet Orbit:				
Romania	231.0	229.0	0.9	229.0
Russia	2,900.0	2,490.0	16.5	2,230.0
Others	100.0	60.0	66.7	60.0
Total	**3,231.0**	**2,779.0**	**16.3**	**2,519.0**
WORLD TOTAL	**20,608.7**	**19,368.1**	**6.3**	**17,535.9**



High inventories forced a cut in crude production in the second quarter this year to give a net loss of 2.1% for the first half. Gains by gas liquids limited the over-all production cut to 1.1%.

Imports showed a net reduction of 3.1% because the comparison is with the all-time record set in the first half last year.

Demand shows small first-half gain

. . . with much better gain in prospect for second half

TOTAL DEMAND for petroleum set an all-time record in the first quarter of this year with an average of 10,800,000 bbl. daily. However this new peak represented a gain of only 1.5% over the first-quarter average last year and 1.6% over the high rate established during the Suez crisis in 1957.

Total demand averaged 10,012,000 bbl. daily for the first half, including exports at 211,000 bbl. daily. The export rate was the lowest since 1922. Domestic demand at 9,801,000 bbl. daily showed a gain of 202,000 bbl. daily or 2.1%.

First-quarter demand for gasoline did little more than break even with last year. Part of the poor showing can be charged to the weather. Domestic demand was down in January and up in February. The average for the first half is estimated at 4,056,000 bbl. daily for a gain of 1.8% over the same months last year.

Kerosine on Different Basis

Kerosine figures for 1960 are on a slightly different basis from data for previous years. Back in 1953 the Bureau of Mines started reporting jet fuel as a separate product. Data for this product included all kerosine sold as or used in the production of jet fuel. Starting with the January 1960 report, commercial jet fuel, which is a special grade of kerosine, has been included in kerosine figures. This shift accounts for most the 14% increase in demand for kerosine for the first half.

Domestic demand for residual fuel was down 1.7% but is expected to pick up enough in the last 6 months to give a small gain for the year.

Minor products accounted for 31% of the total gain in domestic in the first half even though they represent only 17% of total volume.

Domestic demand is expected to show a gain of 4.4% in the last half of the year compared with the 2.1% for the first half. However, part of the gain can be charged to the low demand in the fourth quarter of 1959.

Production and import rates for the last half will depend on operators' inventory programs. There was a definite need for stock reductions in the first half. Reductions in both crude and product prices forced a cutback in production.

Crude production was down 2.1% for the first half of the year. Even with the 7.6% gain in gas liquids, total domestic production dropped 1.1% under the average for the first half of 1959.

Crude imports gained 4.6% in the first 6 months. Product imports decreased because of the first-quarter comparison. First-quarter product imports were down, but the reduction can't be credited to a low average this year. The drop resulted from comparison with the 1,259,000 bbl. daily for the first quarter last year.

Supply estimates for the last half and for the first quarter of 1961 are based on the assumption that further correction in inventories will be made in the third quarter. The stock reduction for this year is forecast at 98,000 bbl. daily in contrast with a gain of 51,000 bbl. daily since in 1959.

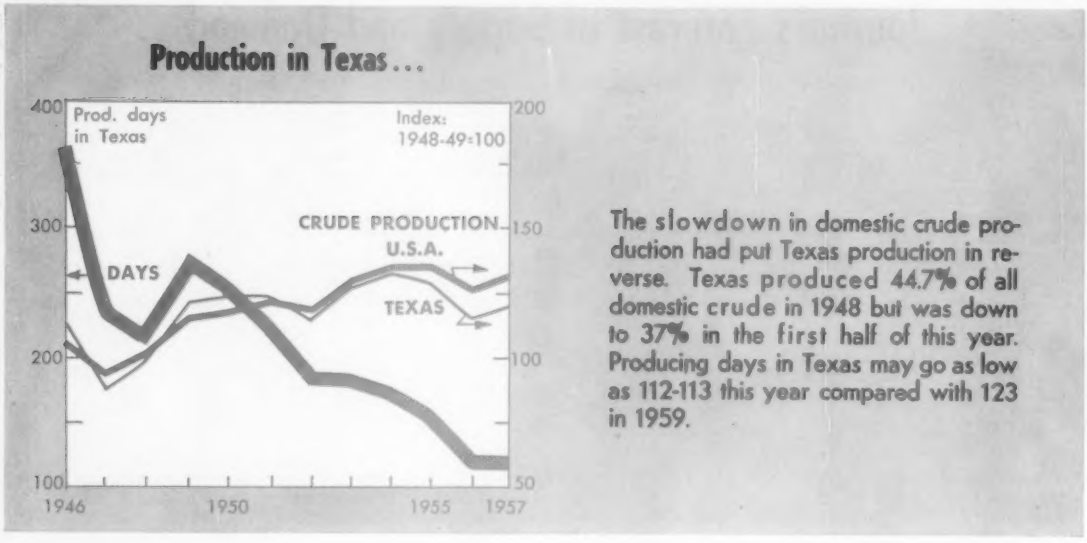
This correction will not bring the stock total down to the level considered desirable by many suppliers, but it probably will prevent a few forced sales of surplus products by refiners this fall and next spring.

Journal's Forecast of Supply and Demand

(Thousands of barrels daily)

	First half		3rd. quarter		4th quarter		Year 1960		1st quar. 1961		1960-61 winter
	Vol.*	% inc. over 1959	Vol.*	% inc. over 1959	Vol.*	% inc. over 1959	Vol.*	% inc. over 1959	Vol.*	% inc. over 1960	qtrs. vol.
Total demand	10,012	1.9	9,360	3.8	10,450	4.6	9,958	3.1	11,100	2.8	10,771
Domestic	9,801	2.1	9,153	4.2	10,247	4.6	9,750	3.2	10,902	2.9	10,571
Export	211	— 6.2	207	—10.0	203	5.1	208	— 1.4	198	— 1.5	200
Gaso. demand	4,099	1.7	4,510	2.3	4,166	4.8	4,219	2.6	3,946	4.4	4,057
Domestic	4,056	1.8	4,465	2.6	4,124	4.9	4,176	2.7	3,910	4.4	4,018
Export	43	— 8.5	45	—21.1	42	— 2.3	43	— 6.5	36	5.9	39
Kero. demand	357	14.1	242	19.8	432	11.1	346	13.8	512	3.9	472
Domestic	355	14.1	240	20.6	428	11.5	344	13.9	509	3.9	468
Export	2	...	2	—33.3	4	—20.0	2	...	3	...	4
Dist. demand	2,062	2.3	1,267	4.2	2,246	5.5	1,908	3.5	2,780	1.5	2,510
Domestic	2,032	2.6	1,235	4.9	2,210	5.2	1,876	3.8	2,750	1.6	2,477
Export	30	—16.7	32	—17.9	36	24.1	32	— 8.6	30	...	33
Resid. demand	1,717	— 2.4	1,292	4.0	1,695	2.4	1,605	0.1	1,991	— 1.1	1,841
Domestic	1,662	— 1.7	1,236	4.7	1,650	2.2	1,552	0.4	1,936	— 1.1	1,791
Export	55	—21.4	56	— 8.2	45	7.1	53	— 7.0	55	— 3.5	50
Jet-fuel demand	276	6.6	310	— 2.5	281	— 9.1	286	— 0.3	310	6.2	295
Domestic	275	6.2	309	— 2.5	280	— 9.1	285	— 0.3	309	6.2	294
Export	1	...	1	...	1	...	1	...	1	...	1
Lubri. demand	163	3.8	165	5.1	161	5.2	163	4.5	160	5.3	161
Domestic	121	2.5	125	5.0	121	7.1	122	4.3	120	6.2	121
Export	42	7.7	40	5.3	40	...	41	5.1	40	2.6	40
Asph. & rd. oil	235	— 3.3	515	8.4	252	6.3	310	3.3	123	7.0	188
Domestic	233	— 3.3	512	8.5	250	6.4	308	3.4	121	7.1	186
Export	2	...	3	...	2	...	2	...	2	...	2
LPG Demand	629	12.1	562	7.3	754	8.5	644	9.8	795	5.4	774
Domestic	622	12.1	556	7.1	748	8.6	637	9.8	788	5.5	768
Export	7	16.7	6	20.0	6	...	7	16.7	7	...	6
Other & loss	474	— 2.1	497	4.6	463	3.3	477	1.1	483	4.1	473
Domestic	445	— 3.5	475	5.1	436	3.1	450	0.2	459	5.3	447
Export	29	26.1	22	— 4.3	27	8.0	27	17.4	24	—14.3	26
Stock change	—184	...	277	...	—303	.....	—98	...	—642	...	—471
Crude	— 17	...	...	...	...	...	— 8	...	— 24	...	— 12
Products	—167	...	277	...	—303	...	—90	...	—618	...	—459
Total new supply	9,828	— 1.5	9,637	4.8	10,147	4.4	9,860	1.5	10,458	3.5	10,300
Imports	1,847	— 3.1	1,660	8.2	1,910	7.5	1,816	2.0	2,010	2.9	1,959
Crude	1,004	4.6	1,000	5.8	1,000	0.4	1,002	3.8	1,020	5.9	1,010
Products	843	—10.9	660	12.1	910	16.5	814	— 0.1	990	...	949
Production	7,981	— 1.1	7,977	4.2	8,237	3.7	8,044	1.4	8,448	3.6	8,341
Crude	7,043	— 2.1	7,062	3.8	7,272	3.5	7,105	0.7	7,468	3.7	7,369
Gas liquids	938	7.6	915	6.9	965	5.3	939	6.8	980	2.7	972
Runs to stills	8,040	— 0.1	8,029	3.1	8,239	4.0	8,087	1.2	8,472	4.7	8,354
Stocks—total	775.5	...	801.0	...	773.1	...	773.1	...	715.3	...	715.3
Gasoline	201.7	...	174.2	...	183.5	...	183.5	...	204.5	...	204.5
Kerosine	27.5	...	30.5	...	27.1	...	27.1	...	17.5	...	17.5
Distillate	111.7	...	164.7	...	134.9	...	134.9	...	73.5	...	73.5
Residual	41.2	...	44.2	...	44.2	...	44.2	...	40.6	...	40.6
Other prod.	139.4	...	133.4	...	129.4	...	129.4	...	127.4	...	127.4
Crude	254.0	...	254.0	...	254.0	...	254.0	...	251.8	...	251.8

*First quarter actual, part of second quarter estimated, last half and first quarter of 1961 forecast.



The slowdown in domestic crude production had put Texas production in reverse. Texas produced 44.7% of all domestic crude in 1948 but was down to 37% in the first half of this year. Producing days in Texas may go as low as 112-113 this year compared with 123 in 1959.

First-half production down again

- More crude imports
- Refiners cut stocks
- Lower crude-stock gain
- More gas liquids

CRUDE PRODUCTION dropped in the first half of this year. The average for the first 6 months was 7,042,500 bbl. daily, representing a decrease of 151,900 bbl. daily from the average for the first 6 months of 1959.

This reduction is not something new for producers in this country. First-half production has shown a loss in five of the years since World War II.

The largest postwar drop came in 1958, the year after the Suez crisis. Production for the first 6 months of that year showed a loss of 1,002,000 bbl. daily from the all-time record set in the first half of 1957.

While this year's loss is not the largest, it is significant. The average for the first half was the lowest since 1955.

There were several factors contributing to low production in the first 6 months of this year.

... Crude imports averaged about 40,000 bbl. daily more than a year earlier. This imported crude tended to replace domestic crude at refineries.

... Refiners have used less crude this year by supplying product demand out of accumulated inventories. Product stocks increased about 17,000,000 bbl. in the first half of 1959. Suppliers reduced product inventories by almost twice that amount this year. The net result of the shift from additions to withdrawals accounts for almost 50,000 bbl. daily of crude.

... Last year, operators also increased crude stocks by almost 10,000,000 bbl. Current Bureau of Mines reports show a much smaller crude-stock gain this year. This also means a lower crude-production rate.

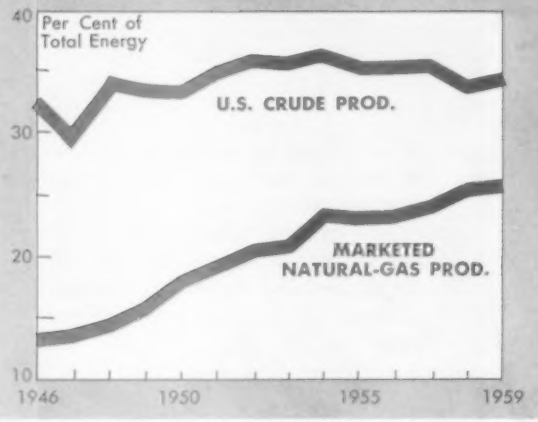
... Increased production of natural-gas liquids took a larger share of the market. Total demand for all products increases 2.2% in the first half. Production of gas liquids showed a gain of 7.6%. Gas liquids accounted for 10.81% of domestic pro-

Leading producing states

... and their percentage contributions to U. S. total since 1948

	First half 1960	1959	1955	1951	1948
Colorado	1.8	1.8	2.1	1.2	0.9
Montana	1.1	1.2	0.6	0.4	0.5
Nebraska	0.9	0.9	0.5	0.1	....
N. Dakota	0.8	0.7	0.4	....	....
Utah	1.5	1.6	0.1	0.1	....
Wyoming	4.9	4.9	4.0	3.1	2.7
Rocky Mtn.	11.0	11.1	7.7	4.9	4.1
Illinois	3.0	3.0	3.3	2.7	3.2
Indiana	0.5	0.5	0.4	0.5	0.3
Kentucky	0.9	1.0	0.6	0.5	0.4
Michigan	0.5	0.4	0.4	0.6	0.8
N. Central	4.9	4.9	4.7	4.3	4.7
Oklahoma	7.6	7.6	8.2	8.3	7.6
Kansas	4.3	4.6	4.9	5.1	5.5
Arkansas	1.1	1.0	1.1	1.3	1.6
Louisiana	15.2	13.8	10.9	10.3	9.0
Texas	37.0	38.2	42.4	44.9	44.7
New Mexico	4.2	4.1	3.3	2.3	2.4
Mississippi	2.0	1.9	1.5	1.6	2.3
California	11.8	11.9	14.3	15.8	16.8

Growth of crude production vs. natural gas...



Rapid expansion in use of natural gas has been a factor in limiting the growth of crude production over past 10 years. Domestic crude supplied a smaller percentage of total energy in 1959 than in any year from 1952 through 1957.

Natural gas now supplies about 27% of total energy requirements or about double its portion at the end of World War II.

duction in the first half of 1959. The ratio was up to 11.75% this year.

Demand for crude was down this year. Here are a few of the proration programs used to bring crude supply in line with demand.

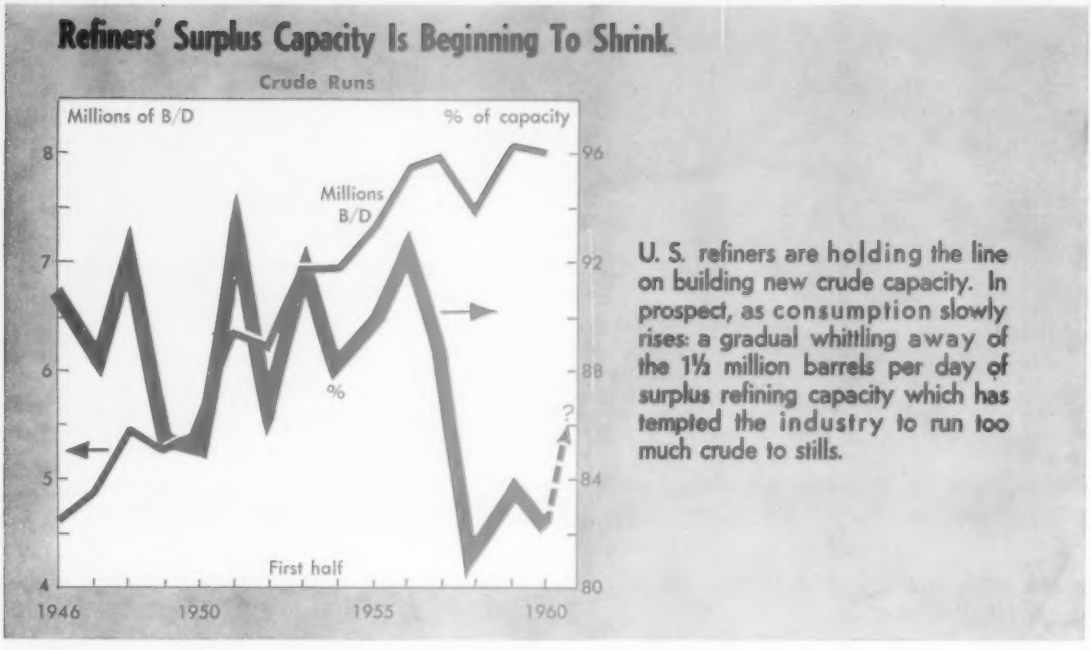
- Texas cut prorated wells to 55 days out of 182, a reduction of 60% from full production rate. Producers had 68 days in the same period last year.
- Louisiana cut the May-June allowable to 33% of the March 1953 depth bracket formula. It had been 35%.
- Oklahoma reduced allowables to 507,000 bbl. daily in June from 540,000 in January. The commission announced another reduction to 488,000 for July.
- New Mexico's allowable was down 13,000 bbl. daily to 349,000 for June.

Production in the last half will show a good gain over the last half of 1959, but part of the increase will be due to the fact that production was cut sharply in both the third and fourth quarters last year.

U.S. crude-oil production, first half of year

(Thousands of barrels daily)

	1960	1959	1958	1957	1956	1955	1954	1953	1952	1951	1950	1949
Alabama	17.4	13.2	15.7	13.9	6.4	3.7	4.5	4.7	2.7	2.8	1.6	1.2
Arkansas	77.8	78.8	79.3	85.6	78.8	78.0	81.4	81.0	80.2	81.7	85.8	84.8
California	830.7	844.4	870.0	931.6	966.1	971.2	989.4	998.1	980.0	964.9	866.6	938.2
Colorado	128.1	126.2	136.8	155.2	162.3	139.2	120.8	95.3	80.8	76.7	60.3	63.7
Florida	1.1	1.2	1.2	1.3	1.3	1.3	1.5	1.5	1.7	1.6	1.1	1.3
Illinois	213.7	215.0	218.4	207.8	225.9	218.7	177.7	160.7	164.1	166.3	169.4	175.5
Indiana	31.9	33.4	32.2	35.4	29.1	29.9	31.7	35.6	31.5	28.0	28.9	24.3
Kansas	303.2	332.7	319.8	341.7	343.1	331.8	328.7	328.9	296.4	309.4	286.2	288.0
Kentucky	61.2	74.5	43.4	46.9	48.0	40.5	37.2	30.6	34.4	29.0	26.5	23.2
Louisiana	1,072.7	946.2	830.1	984.8	808.2	725.3	707.0	708.5	645.6	632.9	547.3	520.8
Michigan	36.3	26.6	25.5	28.3	29.6	31.6	33.5	33.9	37.1	39.3	44.7	44.6
Mississippi	140.4	123.8	100.1	112.8	111.9	98.3	95.0	99.4	99.8	102.4	101.0	108.5
Montana	80.9	81.6	75.6	56.6	56.8	43.9	37.2	30.9	23.7	24.4	21.8	25.8
Nebraska	62.5	61.3	53.1	49.9	42.1	27.5	20.4	16.2	6.2	7.6	2.3	0.6
Nevada	.....	.....	0.1	0.1	0.2	0.2	.....	.....	.....	.....	.....	.....
New Mexico	297.8	287.0	261.1	261.3	238.2	222.8	201.1	187.3	150.9	140.3	126.6	132.9
New York	5.0	5.4	6.5	7.4	7.5	8.1	9.1	10.7	11.7	11.6	11.5	12.3
North Dakota	56.7	49.1	40.8	38.6	35.9	27.1	14.5	14.6	1.2	.....	.....	.....
Ohio	13.6	15.5	17.3	13.7	12.6	11.5	11.0	9.4	9.0	8.8	9.3	9.6
Oklahoma	534.5	556.5	545.4	610.8	600.4	545.9	532.9	558.4	507.1	504.2	417.8	419.1
Pennsylvania	16.7	16.5	18.4	23.1	22.4	23.1	26.4	29.5	31.3	31.8	31.8	32.1
Texas	2,603.5	2,849.1	2,432.3	3,150.8	3,041.3	2,913.8	2,725.2	2,836.3	2,722.9	2,695.3	2,034.8	2,106.8
Utah	107.4	110.4	40.6	10.5	5.5	6.0	5.4	5.2	4.3	3.5	3.2	0.8
West Virginia	6.0	5.9	6.0	5.9	6.0	6.5	8.2	7.5	7.1	7.5	7.9	7.5
Wyoming	341.9	339.5	300.5	297.9	286.1	267.1	252.5	213.5	175.4	190.2	159.8	127.1
Misc.	1.5	0.6	0.5	0.3	0.3	0.3	0.4	0.2	0.2	0.2	0.2	0.3
Total U. S.	7,042.5	7,194.4	6,470.7	7,472.2	7,166.0	6,773.3	6,452.7	6,497.9	6,105.3	6,060.4	5,046.4	5,149.0


Refiners' Surplus Capacity Is Beginning To Shrink.
Crude Runs
Millions of B/D
% of capacity
Millions B/D
%
First half
1946
1950
1955
1960
U. S. refiners are holding the line on building new crude capacity. In prospect, as consumption slowly rises: a gradual whittling away of the 1½ million barrels per day of surplus refining capacity which has tempted the industry to run too much crude to stills.

Still too much processing capacity

EXCESS PROCESSING CAPACITY continued to plague refiners during the first half of 1960.

The bulge of nearly 1.7 million barrels per day in unused capacity posed a daily temptation to run those incremental barrels. Many refiners succumbed; as a result product prices remained soft through most of the 6-month period.

Even though refinery runs were higher than justified, the industry did hew more closely to demand than during the first half of 1959. Runs this year averaged 8,040,000 bbl. daily vs. 8,052,000 bbl. in the same period last year.

The outlook at midyear is encouraging. Construction of new refining capacity is at low ebb. It appears that new additions to capacity are going to continue at a very low figure for at least the next year. If so, refiners will bottom out from their 3-year low in level of operations as related to capacity.

Two projects are due to come on stream in the Far West later this year. Standard of California will bring the 32,000-bbl. per day crude unit of its new Honolulu refinery into operation before 1961. Signal Oil & Gas Co. plans to resume operations in the Hancock refinery at Signal Hill, Calif., at the 20,000-bbl. per day level by December.

January-June refinery runs—by districts

(Thousands of barrels daily)

	1960*	1959	1958	1957	1956	1955	1954	1953	1952	1951	% of total 1960	% of total 1951
East Coast	1,111	1,135	1,114	1,206	1,102	1,048	1,024	1,043	996	1,010	13.8	15.7
Appalachian:												
District 1	99	96	91	100	99	96	108	108	106	103	1.2	1.6
District 2	95	103	98	98	103	93	90	91	70	76	1.2	1.2
Ill., Ind., Ky.	1,484	1,482	1,376	1,396	1,393	1,353	1,288	1,246	1,158	1,195	18.5	18.5
Minn., Wis., Dak.	120	104	104	99	86	(†)	(†)	(†)	(†)	(†)	1.5	...
Okla., Kans., Mo.	721	742	698	689	686	654	591	580	502	529	9.0	8.2
Texas:												
Inland	294	279	262	269	272	253	245	264	253	238	3.7	3.7
Gulf Coast	1,903	1,893	1,683	1,939	1,988	1,828	1,672	1,738	1,473	1,552	23.7	24.1
La. Gulf	662	703	642	671	705	642	562	548	515	491	8.2	7.6
N. La.-Ark.	105	100	99	88	86	89	87	85	77	78	1.3	1.2
Rocky Mtn.:												
New Mexico	24	23	25	27	22	21	19	19	17	14	0.3	0.2
Other Rocky Mtn.	276	279	254	270	265	249	237	229	211	214	3.4	3.3
West Coast	1,146	1,113	1,044	1,150	1,099	1,039	1,032	1,029	968	945	14.2	14.7
Total U. S.	8,040	8,052	7,490	8,002	7,906	7,365	6,955	6,980	6,346	6,445	100.0	100.0

*Based on 4 months Bureau of Mines and 2 months API. †Included in Illinois, Indiana, Kentucky district.

Other than these, prospects for new additions amount to less than 10,000 bbl. daily for the remainder of the country. Moreover, projects thus far slated for 1961 call for no more than 10,000 bbl. daily, a drop in the bucket.

The ratio of runs to capacity should begin an upturn later this year. But at a realistic annual increase of 3% in demand, it will take a long time for refiners to regain the workable operating level of 92% of capacity. Should capacity remain completely static, this level could not be attained before January 1964.

The carryover from the refinery building boom of the late 50's is evident in charting actual refinery runs and runs as a percentage of capacity. New construction spurred by the Government's incentive of rapid amortization came at a time when annual gains in consumption began dropping from the historical 6% to 3%.

Four years ago the refining industry had accumulated a million barrels per day in unused capacity. The surplus has grown to 1.5 million for the past 3 years, contributing to an average operating level of less than 85% of total calendar-day capacity.

Octanes move slowly. The past year has seen a very gradual rise in octanes. Premium gasoline has moved from 99.1 to 99.4 research octane, and 89.0 to 89.8 motor octane. Regular-grade has risen on the average, from 92.0 to 92.5 RON and from 84.2 to 84.4 MON. Tetraethyl lead content has dropped from 2.57 ml. per gal. to 2.46 for premium-grade and from 1.89 to 1.75 ml. per gal. for regular-grade.

Long on octanes. Refiners find themselves with more than adequate facilities for product quality as well as quantity. This year there is no pressure on premium or superpremium octanes from Detroit. The emphasis is on economy.

As a result, more and more new cars hitting the highways are satisfied with regular-grade gasoline, or so their manufacturers claim. Some of these cars are barely satisfied with regular grade, and the pressure has pushed regular octanes up faster than premium.

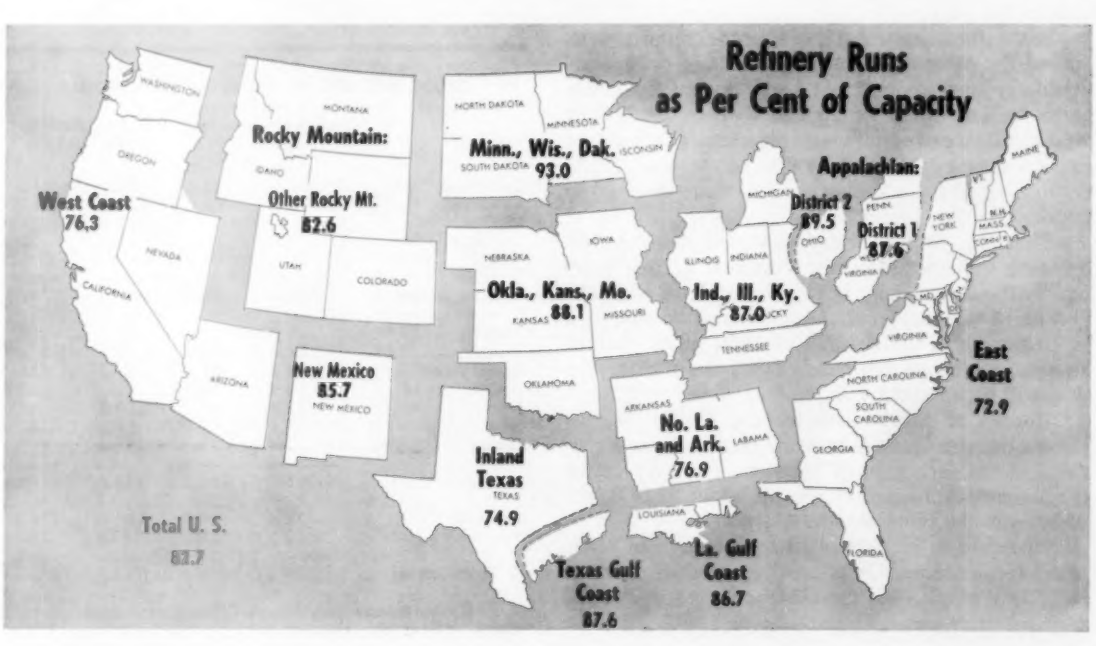
The low level of construction for downstream processing units reflects this relatively static octane situation. Only two catalytic reformers are building today. Catalytic cracking capacity is edging upward with nine current projects adding 157,000 bbl. per day in new units or expansion of existing ones.

The broadening of alkylation continues with six units totaling 26,100 bbl. daily new building or contracted. Other construction is practically at a standstill.

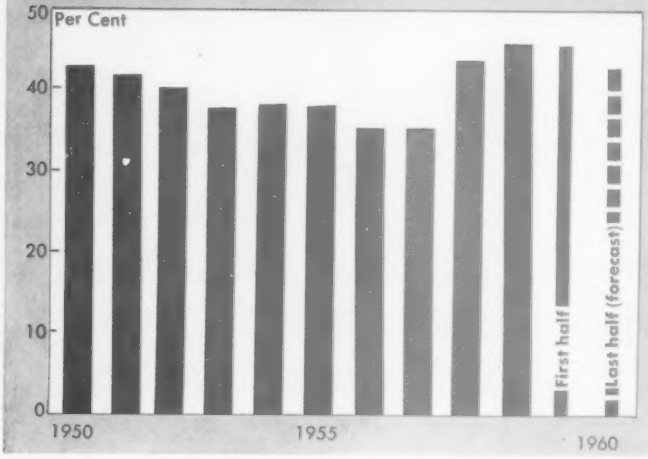
Runs and product output

(Thousands of barrels daily)

	Runs	Gasoline	Kero-sine	Distil-late	Resid-ual
1948	5,549	2,446	333	1,040	1,274
1949	5,326	2,572	280	934	1,164
1950	5,739	2,735	325	1,093	1,165
1951	6,494	3,037	372	1,304	1,286
1952	6,670	3,160	361	1,422	1,240
1953	7,000	3,381	338	1,447	1,233
1954	6,958	3,378	335	1,486	1,142
1955	7,480	3,648	321	1,651	1,152
1956	7,937	3,904	337	1,819	1,166
1957					
First half	8,002	3,889	310	1,889	1,188
Last half	7,837	3,991	287	1,776	1,090
1958					
First half	7,490	3,798	301	1,672	998
Last half	7,792	4,088	302	1,787	993
1959					
First half	8,052	4,001	317	1,925	1,006
Last half	7,936	4,072	290	1,796	901
1960					
First half	8,040	4,094	362	1,797	943



Refined-product portion of total imports . . .



Refined products accounted for a declining portion of total imports in the 1950-57 period. The downward trend was broken in 1958.

Under the Government's program of voluntary restrictions on crude imports in 1958, importers shifted from crude to products. Note the tall bars for 1958 and 1959.

With both crude and products limited under the current program, product imports may return to the 1950-57 trend.

Imports drop, but decline due to abnormal 1959

REFINERS AND MARKETERS imported less petroleum in the first half of 1960 than in the same months of 1959. There is a good reason for the drop. The shift can be charged to peak imports in the first quarter last year.

In the first quarter of 1959, crude imports were limited by voluntary control. There was no restriction on product imports, but it was evident that some quota system would be applied to both crude and products. The end result was a big increase in product imports during the first 3 months of the year. Product imports averaged almost a third more than crude imports for the quarter.

That big first quarter accounted for the 3% decrease in imports for the first half of this year. Last-half imports may be up as much as 100,000 bbl. daily over last year. Again, it will be due to a big reduction in the last half of 1959 rather than to any major change this year. Total imports for the year will be up about 1%.

Bureau of Mines data for the first 4 months show a definite increase in crude imports from Venezuela in the early part of the year. The average for the January-April period was up about 58,000 bbl. daily from the same months last year.

The gain in imports of heavy Venezuelan crude is related to rumors of a possible residual shortage early this year. Also, there has been good demand for asphalt crudes.

IMPORTS INTO UNITED STATES
(Thousands of barrels daily)

	Jan.-June 1960*	Jan.-June 1959	Change	Per cent change
Crude	1,003.3	959.9	43.4	4.5
Residual	693.6	704.0	—10.4	— 1.5
Other oils	150.0	242.1	—92.1	—38.0
Total	1,846.9	1,906.0	—59.1	— 3.1

EXPORTS
(Thousands of barrels daily)

	Jan.-June 1960*	Jan.-June 1959	Change	Per cent change
Crude	8.9	7.3	1.6	21.9
Gasoline	42.4	58.4	—16.0	—27.4
Kerosine	2.4	1.5	0.9	60.0
Distillate fuel	30.4	37.6	— 7.2	—19.1
Residual fuel	54.8	84.6	—29.8	—35.2
Lube oils	42.2	38.7	3.5	9.0
Other oils	29.3	24.3	5.0	20.6
Total	210.4	252.4	—42.0	—16.6

*Four months actual, two months estimated.

CRUDE IMPORTS BY COUNTRY OF ORIGIN*
(Thousands of barrels daily)

	Jan.-Apr. 1960	Jan.-Apr. 1959	Jan.-Apr. 1958	Jan.-Apr. 1957
Mexico	....	1.0	1.9	10.0
Colombia	48.6	27.6	22.2	23.2
Venezuela	466.8	409.0	428.3	542.9
Peru	....	....	1.6	....
Trinidad	1.0	....	1.0	....
Brazil	....	1.2	2.2	....
Latin America	516.4	438.8	457.2	576.1
Algeria	1.0	....	....	....
Kuwait	134.8	154.0	†179.9	45.1
Saudi Arabia	84.2	67.6	†103.3	3.8
Neutral Zone	36.4	34.4	....	5.1
Iraq	12.5	28.8	25.3	....
Iran	47.0	16.5	12.6	5.9
Qatar	2.4	....	5.4	....
Middle East	318.3	301.3	326.5	‡59.9
Canada	118.6	83.5	105.3	176.1
Far East	50.9	80.7	45.8	33.0
Total crude	1,004.2	904.3	934.8	845.1

*U. S. Bureau of Mines. †Includes some Neutral Zone. ‡Suez closed.

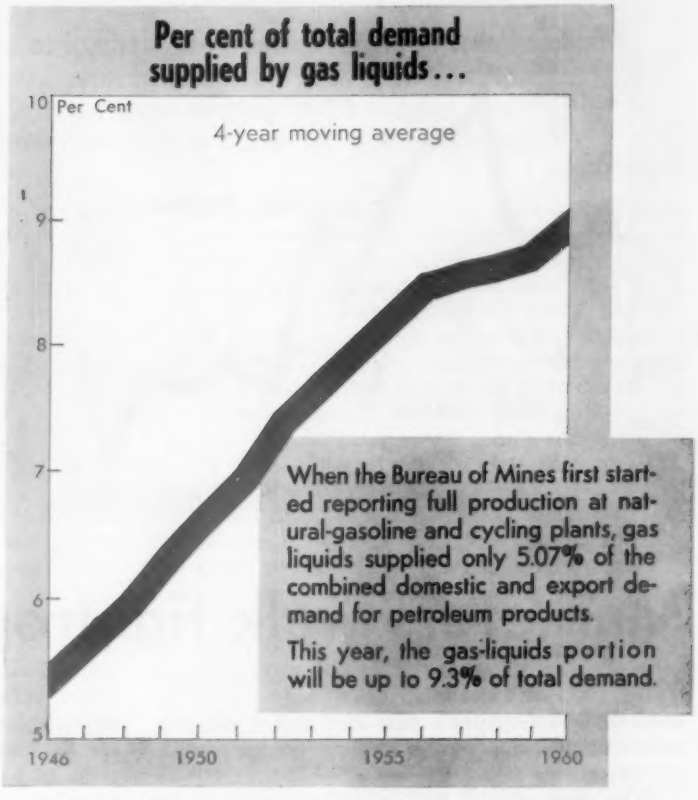
Gas-liquids production nearly doubles in 10 years

PRODUCTION at natural-gasoline and cycling plants this year will be almost three times the total at the end of World War II. Also, the production rate has almost doubled in the past 10 years. Growth rates have been tied to production of natural gas.

Total production at plants averaged 39,337,000 gal. daily for the first half, representing a gain of 7.5% over production reported for the first half of 1959. Output for the last half is expected to be slightly larger than the first-half total.

Five states accounted for 86.2% of total plant production during the first 6 months of the year. These states were: Texas with 51.0%, Louisiana with 11.6%, Oklahoma with 8.7%, California with 8.5%, and New Mexico with 6.4%.

Production of LPG represented 58.7% of total plant output compared with 58.6% last year, indicating about the same rate of growth as that reported for total products.


Per cent of total demand supplied by gas liquids...
Per Cent
4-year moving average
10
9
8
7
6
5
1946
1950
1955
1960
When the Bureau of Mines first started reporting full production at natural-gasoline and cycling plants, gas liquids supplied only 5.07% of the combined domestic and export demand for petroleum products.
This year, the gas-liquids portion will be up to 9.3% of total demand.

Gains for this portion of gas-liquids production seem to be slowing down. In the past, LPG's position moved from 39.1% of total plant production in 1950 to 50.5% in 1955, and to 58.6% last year.

First-half gains by products were: LPG 7.8%, natural gasoline 4.9%, and other products 14.2%. The abnormal gain for other products was due to greater condensate production in South Louisiana.

Production at natural-gasoline and cycling plants

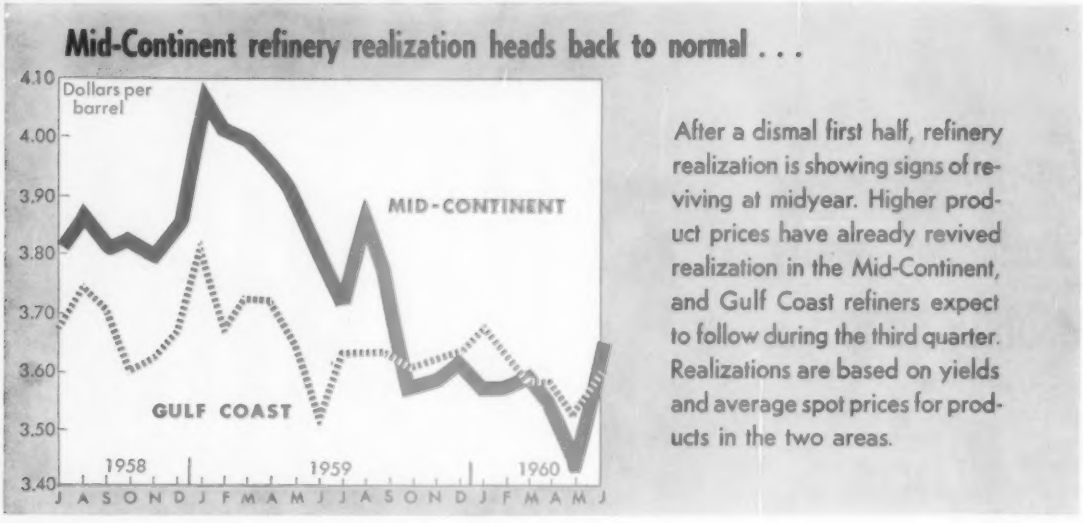
(Thousands of gallons daily)

	LPG	Natural gaso.‡	Other	Total	Increase, % Total	Increase, % LPG
1946	3,763	7,472	2,083	13,318	3.3	5.6
1947	5,074	7,627	2,507	15,208	14.2	34.8
1948	5,880	8,295	2,659	16,834	10.7	15.9
1949	6,518	8,388	3,171	18,077	7.4	10.9
1950	8,198	8,963	3,780	20,941	15.8	25.8
1951	9,761	9,832	3,969	23,562	12.5	19.1
1952	11,445	10,277	3,923	25,645	8.8	17.3
1953	12,659	10,769	4,023	27,451	7.0	10.6
1954	14,259	11,248	3,507	29,014	5.7	12.6
1955	16,363	12,214	3,801	32,378	11.6	14.8
1956	17,725	12,128	3,738	33,591	3.7	8.3
1957	18,234	12,120	3,590	33,944	1.1	2.9
1958	18,439	11,595	3,370	33,404	−1.6	1.1
1959	21,574	11,560	3,753	36,887	10.4	17.0
First half	21,444	11,418	3,721	36,583	11.8	18.1
Last half	21,702	11,700	3,785	37,187	9.1	15.9
1960:						
First half*	23,106	11,982	4,249	39,337	7.5	7.8
Last half†	23,440	12,100	3,940	39,480	6.2	8.0

*Four months actual, two months estimated. †Forecast. ‡Isopentane included in natural gasoline.

	1958 First half	1959 First half	1959 Last half	1960 First half*
Appalachian	533	849	1,029	1,032
Ill., Mich., Ohio	974	964	1,010	978
Kentucky	515	623	587	675
Kansas	672	669	647	767
Neb.-N. D.	236	283	296	287
Oklahoma	3,018	3,124	3,135	3,436
Texas	17,422	19,739	19,407	20,047
Gulf	4,078	4,456	4,410	4,601
East Texas	709	816	656	650
Panhandle	2,841	3,228	3,266	3,382
West Texas	5,342	6,564	6,555	6,551
Rest of state	4,452	4,675	4,520	4,863
Arkansas	243	255	259	310
Louisiana	3,164	3,583	3,837	4,555
Gulf	1,768	1,960	2,100	2,851
Inland	1,396	1,623	1,737	1,704
Mississippi	97	108	81	98
New Mexico	1,917	2,254	2,602	2,500
Rocky Mtn.	663	800	884	1,321
California	3,267	3,332	3,413	3,331
Total U. S.	32,721	36,583	37,187	39,337

*Four months actual, two months estimated.


Mid-Continent refinery realization heads back to normal . . .
Dollars per barrel
4.10
4.00
3.90
3.80
3.70
3.60
3.50
3.40
MID-CONTINENT
GULF COAST
1958
1959
1960
J A S O N D J F M A M J J A S O N D J F M A M J
After a dismal first half, refinery realization is showing signs of reviving at midyear. Higher product prices have already revived realization in the Mid-Continent, and Gulf Coast refiners expect to follow during the third quarter. Realizations are based on yields and average spot prices for products in the two areas.

Marketers walk tightrope in first half

MARKETWISE, 1960's first half was a nervous period of oversupply of crude and products, with soft prices.

The year started with excess capacity at all levels; demand thus trailed supply until March, when winter's delayed demand for heating oil skyrocketed.

The vagaries of the weather kept refiners off balance through the first quarter. The East Coast was mild, when cold was expected. Midwest temperatures, expected mild, turned up cold and wet.

When December's mild weather held demand below expectations, it was clear that refinery runs should have been reduced. Instead, runs were boosted, and in January were further increased, despite the danger signals that were up. This created an artificial demand for crude oil, and caused too-high state production allowables for February.

Stocks of light fuel oil and gasoline were in a split-personality demand period. Gasoline stocks, as early as the last half of January, were 15 million barrels above the level considered adequate for April 1, normal peak inventory date. Refiners calmly ignored seasonal variation of demand.

In February the weather began to swing back in industry's favor. The East Coast continued warmer than normal, but the rest of the country offset this mildness. Even so, the 2-month demand for light fuel oils was then 7½% below 1959. Gasoline demand showed some improvement, 3.6% over January, but not enough to offset light-fuel-oil weakness; thus over-all demand trailed 1959's by 2.1%.

Weather performance continued perverse in the two largest demand areas—East Coast and Midwest—but refiners still ignored the pattern and supply moved in the wrong direction. At a time of certain seasonal decline in demand, heavy inventories of light fuel and gasoline made it imperative to reduce supply. It was increased instead. Crude allowables were set in excess of indicated needs.

February ended with over-all petroleum stocks 28 million barrels higher than a year earlier. They were roughly 75 million barrels above a level considered adequate for that date.

Frigid March. March roared in as the coldest month of the season, 38% colder than usual, bringing a January-size demand for light heating oils. This demand was 30% more than normal. Over-all, the heating season was 5% colder than normal. Domestic demand for heavy fuel, despite high industrial activity, for the first quarter trailed that of the same period a year earlier.

Never before in March was so much oil taken out of storage. The net liquidation was 34 million barrels, in sharp contrast with a year before when there was a 7-million-barrel buildup.

There was no significant price activity during the month. Scattered modest advances for gasoline were offset by reductions for fuel oils.

The heating season was too far spent for cold weather to do more than arrest the withering distillate prices. The one bright spot was that middle-distillate fuels were liquidated, dropping from 170 million barrels on January 1 to 74 million on March 31. Distillate prices for the month averaged 15% lower than a year earlier, with no prospect at that time that recovery would come until after the middle of the year.

Gasoline prices were 3% below a year earlier. Crude supply remained excessive, and refiners processed it into unneeded gasoline.

> **Combined crude and products inventories in first half were 42 million barrels lower than in 1959. But such a comparison is dangerous because at the close of May 1959, surplus crude and products on hand amounted to about 80 million barrels.**

Notwithstanding the colder weather, and substantially higher level of industrial activity, first-quarter demand for petroleum gained only 1.5%. Prices were understandably soft, and posted prices were under constant pressure from low, undercover spot prices. First-quarter earnings reflected this quarter of excess supply, disappointing contraseasonal demand, and depressed prices.

Second Quarter

The same overtone of excesses was evident as the second quarter opened. April demand was 1,680,000 bbl. per day under March. Light-fuel demand had dropped. Mild weather raised hopes for an early spring, but wet weather delayed farmer demand.

Texas allowables were cut sharply but other states didn't follow its example. Colder-than-normal weather spurred use of residual fuel oil. This demand, coupled with an inadequate, domestic supply, exhausted the 6-month quota of major importers. Quotas were upped, resulting in a larger amount being imported than expected.

Excess product inventories were swollen by excess crude runs, adding more during the month than in any April of the past 12 years. The refiner's pattern was volume and incremental barrels, to achieve lower unit costs. An addition of 14,600,000 bbl. during April boosted total petroleum stocks to 760,400,000 bbl.

Stocks continued to be 60 million barrels in excess of recommendations of the best minds in the industry, with gasoline accounting for more than half and crude oil around a quarter.

The expected corollary came to pass and major product prices weakened in April, the only exception being residual fuel oil in the Gulf Coast. Here the price went up, due to an assist by the Government in residual supply. Gasoline prices, which had increased in March in anticipation of heavy demand, fell back to their February level.

All major products were still priced below year-earlier averages. In the case of distillates and resid it was necessary to go back to 1952 and 1954, respectively, to find lower price tags, despite higher crude and labor costs.

These products became one of the most complex problems facing the industry. The demand of around a million and a half barrels daily is firm—60% is supplied from domestic production, the remainder from imports. It's a market "half free and half slave" with the Government listening to coal interests which are endeavoring to control the supply and thereby the price for resid on the East Coast.

May and better demand. With May came seasonal weather and better demand. But excessive gasoline inventories kept prices low. Indeed, prices in most primary markets continued listless and weak late into May. In the Midwest, Group 3 gasoline advanced a full cent per gallon from May 31 to June 13, canceling out earlier price cuts.

It became increasingly apparent that the market for petroleum products was feeling the impact of gas, and that it would have to adjust to the impact.

Gasoline demand remained good in April and part of May, the latter month ending with a healthy 5.9% increase for all petroleum markets, setting a record May demand.

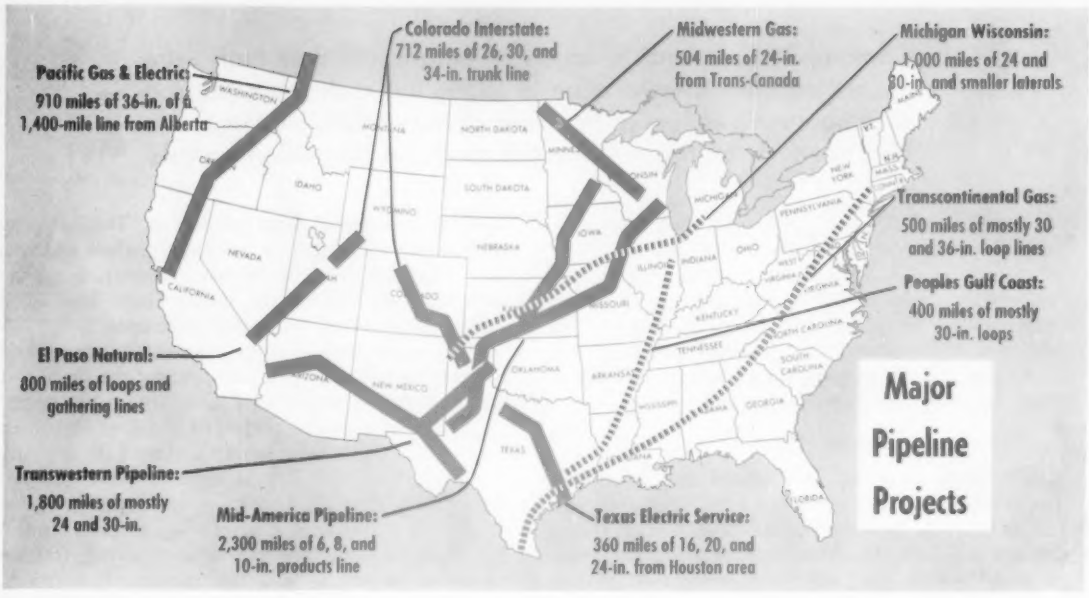
Prices really started improving in early June in the Midwest, with firm interrefinery buying followed by jobber buying, to give that market a firm summer demand basis. Gulf Coast price improvement was already under way by interrefinery buying, plus quota crude swaps for gasoline. But posted prices didn't advance, though discounts off the posted prices narrowed to improve refiners' netbacks. No. 2 posted price rose to 8⅛ cents on the Gulf Coast late in the month, to beat gasoline to summer price recovery. The latter product was comparatively the weakest price material in the Gulf Coast.

Crude stocks too high. June found crude stocks 8,000,000 bbl. above the so-called desirable level. Texas July allowables were held to 8 days. Because of crude oversupply, an excess of 1,100,000 bbl. per day of domestic crude production had been cut from 3 to 25 cents per barrel in 23 specific cuts since January 1.

Gasoline price improvement centered in Group 3 and the Midwest, where gasoline stocks had been excessive since the start of the year. Contraseasonal-demand buying of No. 2 raised that product's price in Group 3 by ¼ cent a gallon on June 21, and a cargo sale from the Gulf Coast 2 days later resulted in a new posting of 8⅛ cents. On June 27 bunker C in the Gulf Coast increased in posted price from $2.10 to $2.20 per barrel.

Late June found oversupply and idle refinery capacity a threat to firmer prices. Erratic runs to stills kept buyers on the sideline for gasoline, especially in the Gulf Coast. That product was freely available during the pre-July Fourth week at ¼ to ⅜ cent off posted markets.

Better balance, inventorywise, between East Coast and Gulf Coast, gave hope of better middle distillate prices in the Gulf Coast as the second half of 1960 started. Continued scattered crude-price cuts in the Illinois basin spread to Michigan. Oversupply worsened, and Texas crude allowables were held to 55 days for the first 6 months of 1960, compared to 68 days in 1959. July Fourth forecast for 1960 Texas allowables was for 114 days, 9 days fewer than for 1959.


Colorado Interstate:
712 miles of 26, 30, and 34-in. trunk line
Midwestern Gas:
504 miles of 24-in. from Trans-Canada
Michigan Wisconsin:
1,000 miles of 24 and 30-in. and smaller laterals
Pacific Gas & Electric:
910 miles of 36-in. of a 1,400-mile line from Alberta
Transcontinental Gas:
500 miles of mostly 30 and 36-in. loop lines
Peoples Gulf Coast:
400 miles of mostly 30-in. loops
El Paso Natural:
800 miles of loops and gathering lines
Major Pipeline Projects
Transwestern Pipeline:
1,800 miles of mostly 24 and 30-in.
Mid-America Pipeline:
2,300 miles of 6, 8, and 10-in. products line
Texas Electric Service:
360 miles of 16, 20, and 24-in. from Houston area

PIPELINES:

After a slow start, a big second half

AGONIZING DELAYS in getting projects through the Federal Power Commission have not altered the expectations of gas pipelines for one of their biggest construction years.

U. S. crude-pipeline construction remains depressed, but products-line activity is up sharply from 1959.

In Canada, activity remains at a low level, but another big construction spurt will start either late this year or in 1961.

Elsewhere in the world, construction is off the 1959 pace, with South America lagging while new projects are numerous in the Eastern Hemisphere.

Here is how pipeline companies view the construction picture at midyear, as disclosed in a world-wide survey by The Oil and Gas Journal:

... U. S. natural gas—13,700 miles compared with 13,500 miles in 1959.

... U. S. products—3,300 miles compared with 1,300 miles in 1959.

... Canadian natural gas—900 miles compared with 950 miles in 1959.

... Canadian crude—400 miles compared with 280 miles in 1959.

... Foreign—5,900 miles compared with 6,700 miles in 1959.

The slight decline in foreign construction will be more than offset by the increase in the United States to raise world-wide totals to about 25,550 miles, almost 1,000 miles above 1959, according to the Journal survey.

Canada's lull, caused by the world crude-oil surplus and the delay in the start of gas-export projects, will be ended by next year.

U. S. Natural Gas

In spite of FPC delays, U. S. natural-gas pipelines expect a big year, going on the assumption that the commission will release this month or next much of the $1 billion in construction now on file.

The biggest single project of the year—Transwestern Pipeline Co.'s 1,800-mile Texas-California system—was completed in the first half. The project, costing $193 million, was started late last year, and more than 1,500 miles was installed the first 6 months of 1960.

Midwestern Gas Transmission Co. is getting under way with its 504-mile 24-in. line from Emerson, Man., to Marshfield, Wis., bringing Canadian gas into the upper Midwest for the first time. The $52-million project has been 5 years in the making.

Midwestern is the first of the recently approved Canadian export proposals to bear fruit. The 1,400-mile 36-in. Alberta-California line, already approved by Canadian authorities, is expected to clear FPC momentarily. If any sizable part of this line, promoted by Pacific Gas & Electric Co., is laid this year, it will add considerably to the forecast mileage. However, with approval coming so late in the construction season, only preliminary work is expected to be done in 1960, especially on the northern section; therefore, this project was not included in the 1960 mileage estimate.

Another question mark is the Provo project of Colorado Interstate Gas Co. and El Paso Natural Gas Co., also involving a supply for California. More than 1,000 miles of 26, 30, and 34-in. pipe will be laid by the end of 1961, perhaps starting this year if FPC approval is obtained in time.

Regardless of the Provo project, El Paso expects to lay more than 800 miles of trunk and gathering lines this year.

Several major projects are ready to kick off. Michigan Wisconsin Pipe Line Co., Natural Gas Pipeline Co. of America, and Peoples Gulf Coast Natural Gas Pipeline Co. awarded contracts in advance of FPC approval. Michigan Wisconsin will lay more than 1,000 miles of up to 30-in. pipe between Texas and Wisconsin, part of it in connection with the Canadian supply available from Midwestern. Natural will lay some 400 miles, including 36-in. loops and a 24-in. line connecting an Oklahoma producing area. Peoples Gulf will loop some 400 miles of its 30-in. system.

Other big natural-gas projects, all slated for the second half, include Panhandle Eastern Pipe Line Co., more than 700 miles, including 300 miles of 30-in. loops; Trunkline Gas Co., 400 miles, including 252 miles of 30-in. loops; Transcontinental Gas Pipe Line Corp., 500 miles of mostly 30 and 36-in. loops between Texas and New York; Tennessee Gas Transmission Co., 300 miles of mostly 30 and 36-in. loops on the Gulf Coast and in the East; Texas Eastern Transmission Corp., 200 miles of 20 to 36-in. in Pennsylvania and New Jersey; and Northern Natural Gas Co., several hundred miles of 30-in. loops and various-diameter laterals in the Midwest.

U. S. Crude Oil

First-of-the-year indications on crude-line construction were that 1960 would be well below 1959, and 1959 was down one-third from the previous year. The midyear forecasts bear out earlier plans.

There is not a single crude trunk-line project of any consequence in sight for this year. Present capacity is adequate to meet requirements for domestic crude oil. Only a few new field connections and system revisions are being made.

There is no indication that another big crude-line building period is near, in view of the world crude surplus, but some major looping projects are in the planning stage.

U. S. Products

The Journal forecast in January was for a big year in products construction, with one condition. That was that Mid-America Pipeline's 2,300-mile butane, propane, and natural-gasoline system, then a question mark, be built.

This report, promoted by the Missouri-Kansas-Texas Railroad, is now well along, and will account for more than two-thirds of the 1960 products mileage. Without it, there would be a repeat of 1959 when activity was slight. In fact, except for natural-gas-liquids lines, products construction would almost be nonexistent.

The longest refined-products line reported this year is 200 miles of 8-in. for Farmers Union Central Exchange, Inc., from Glendive, Mont., to Minot, N. D.

Canada

This was almost Canada's year, but not quite. Everything hinged on early-season approval of gas exports to the United States. Canada's National Energy Board did its part, but FPC was not quick enough with the remaining necessary approval for the biggest project.

So the midsummer outlook was for preliminary work to proceed the rest of this year to be ready for a crash pipe-laying program next year. Some $330 million will be invested in the 36-in. Alberta-California line. (See U. S. Natural Gas.)

Alberta Gas Trunk Line Co., Ltd., which will lay about 600 miles of the line to California, is this year laying some 200 miles on its plains system serving Trans-Canada Pipe Lines, Ltd. This is in connection with the export to Midwestern for which Trans-Canada is laying 124 miles of pipeline and installing new compressor stations.

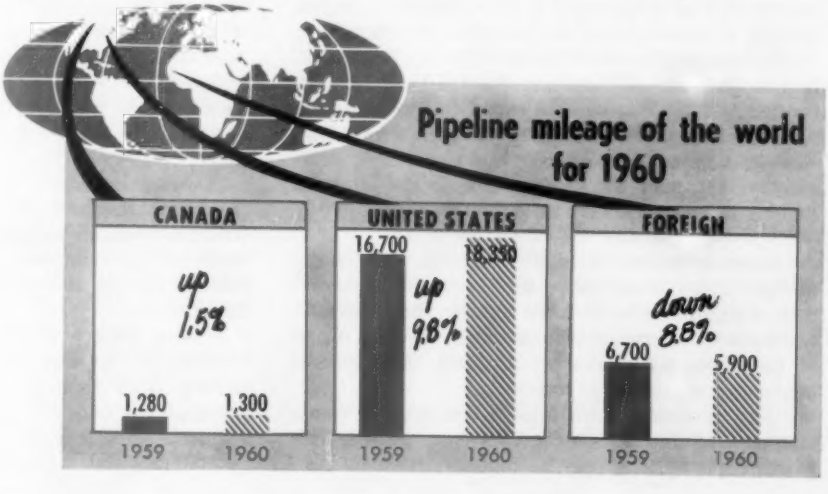
Construction of several hundred miles of natural-gas-liquids lines is expected next year to handle surplus product from processing wet gas for export.

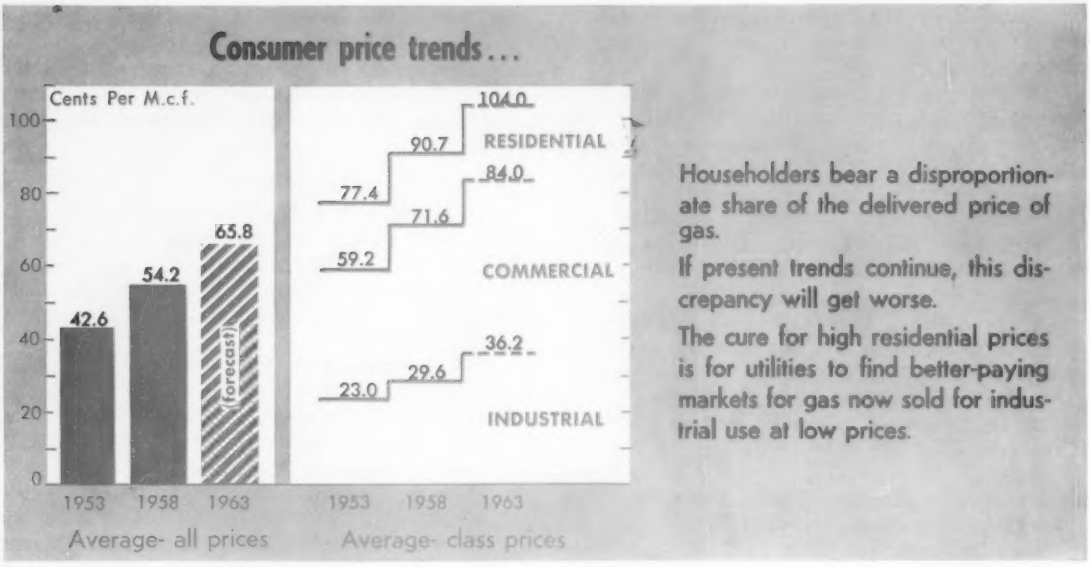
Several big crude-line proposals await government approval or an increase in demand, or both, before anything is done.

Foreign

Major gas lines are under way in Algeria, Mexico, and Russia, while the only important products foreign construction outside is in Iran.

Activity is centered in the Eastern Hemisphere, particularly regarding crude-oil lines, which are having a big year abroad. A second major line is being completed in Algeria, and two are ready to start in Libya, the world's newest important crude source. India's first big crude line is getting started, and a big program is continuing in Iraq. These projects emphasize the increasing importance of the Eastern Hemisphere in the world crude supply.





Why gas prices are high

A BIG REASON why the price of natural gas to household consumers has gone up is that pipelines and distributors have not done good jobs in marketing and in balancing their load factors.

Unless they can develop new industrial uses other than boiler fuel, natural gas will price itself out of many consuming markets.

These are conclusions of a rate expert who has studied the operations of many gas utilities: Roger L. Conkling, of the Washington consulting firm of H. Zinder & Associates, Inc.

Field prices of gas are going to keep on going up, Conkling says. But the cost of transporting and distributing gas has gone up faster than producers' prices.

The average of all consumer gas prices increased 11.6 cents per M.c.f. from 1953 to 1958, Conkling calculated. But producer prices rose only 3.9 cents per M.c.f. The remaining 7.7 cents came from higher charges by transmission and distribution companies.

So the way to hold down prices to consumers is through more efficient distribution. And the way to do this is to improve the "load factor"—that is, to balance off the wide swing between winter and summer volumes by finding a more profitable summer market than the interruptible industrial sales that have been depended on so much.

Summer losses. Conkling reasons that if the utilities could make more money in the summer, they wouldn't have to keep raising their rates to residential and commercial customers to keep ahead of the rising field price of gas and of their own increasing operating expenses.

This is because the total investment in transmission and distribution facilities is to provide sufficient capacity to supply all regular customers during the coldest day of the year. This means that much of the system will be idle much of the year unless "off-peak" markets can be developed.

The most promising way for most utilities to fill in this "valley" has been through selling gas for industrial use under contracts that can be curtailed or suspended when it gets cold. To induce a user to take gas on such terms the price must usually be attractively below coal or oil, and many utilities are prone to make off-peak sales at prices that barely cover their out-of-pocket costs, just to get their lines operating reasonably close to capacity.

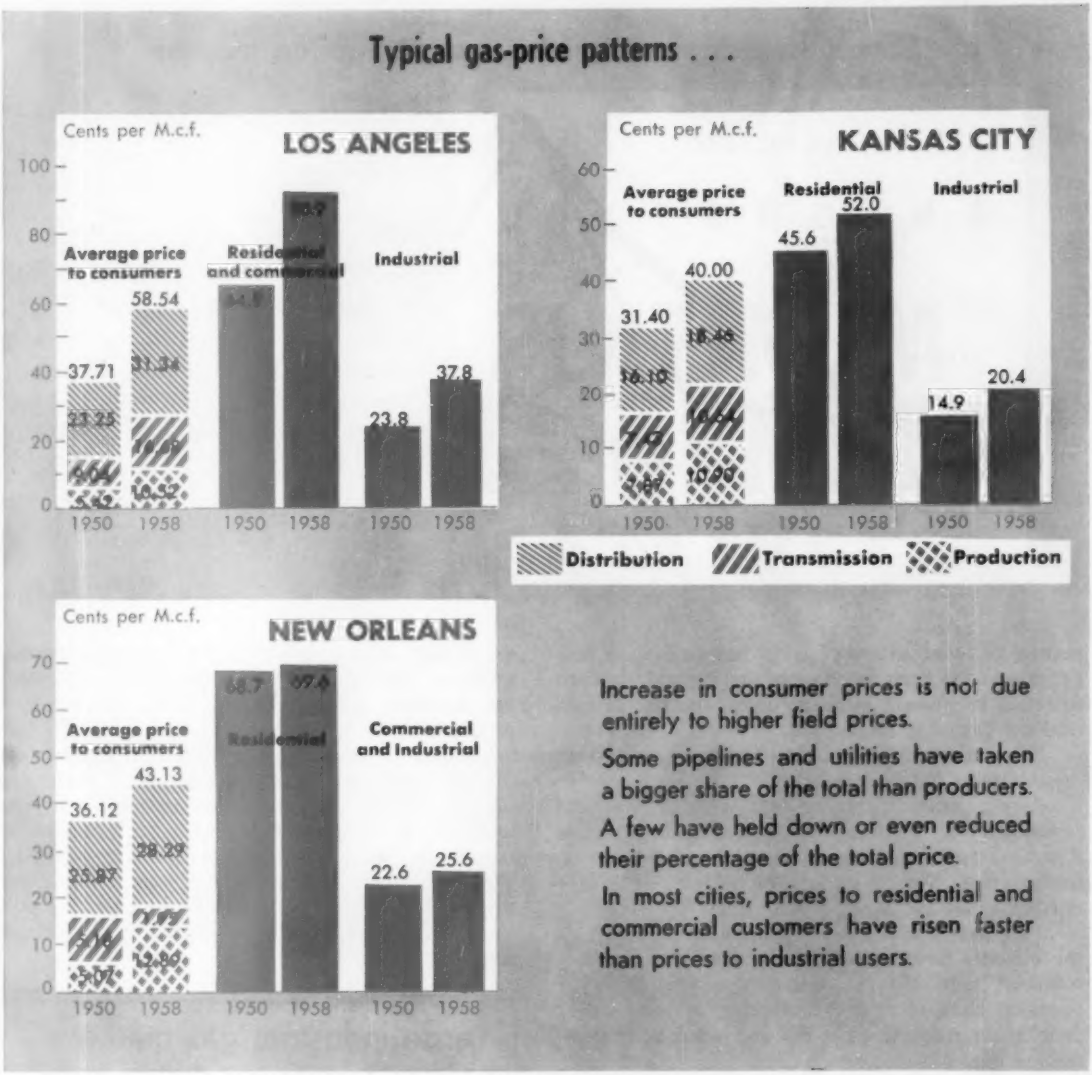
Conkling says this must be changed. He argues that utilities will lose big hunks of their industrial market if they raise prices very much. And if they try to make residential customers bear the full load of higher costs they will begin to lose them, too.

The charts on these three pages were adapted from a large group Conkling used in a presentation to the Industrial and Commercial Gas Sales Conference held by the American Gas Association in Houston last April. They were selected to illustrate general trends, and may not be conclusive as to all areas nor even representative of some.

Costs going up. The trend toward higher costs cannot be reversed and may be difficult to slow down, in Conkling's opinion. Some systems may have more success than others at this, but, viewing the national picture as a whole, he has this to say about field prices:

"With respect to the producing segment of the industry, it appears that the best reserves have already been located. The rich cream has been skimmed off and we are down to the still wholesome but thinner milk.

"Simply stated, the producing industry is find-



ing it necessary to look harder for prospects and to drill deeper at higher cost, and it is discovering less reserves per foot drilled. Producers, however, are working hard to cut down their costs as an offset to the greater difficulty being experienced in locating new reserves.

"As an illustration, due to improved technology it now costs about the same as it did some years ago to drill to the same depth, in spite of inflation. It is the deeper drilling and the reduction in reserves found which account for higher costs."

Key to economy. Transmission and distribution companies, Conkling says, likewise may be able to offset some of their rising costs by technological improvements but their greatest problem and greatest opportunity lies in their load factor:

"The transmission and the distribution ends of the business share a common variable of greatest price and cost importance. This is load factor; the relationship of the average requirements of a system to its peak requirement.

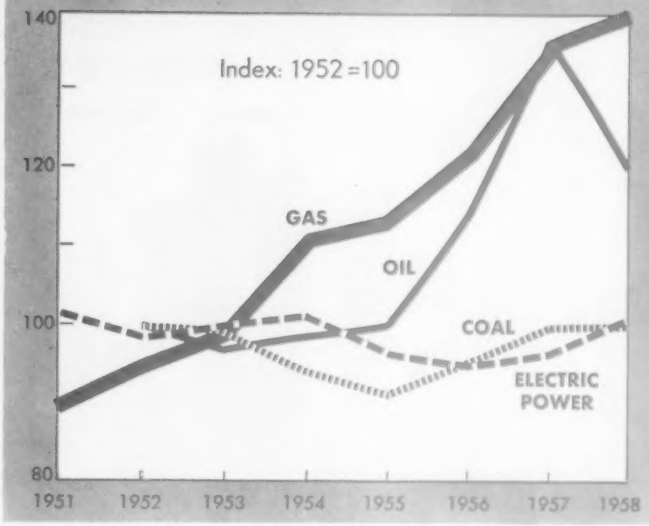
"Load factor is an index of the efficiency of the use of facilities, and the efficient use of facilities is most significant in the transmission and distribution industries where the required plant investments are equal to several years' revenues and the fixed costs of facilities are a very major component of total annual costs.

"A good load factor means economical operation. As load factor improves, the inescapable fixed costs of the business can be spread over a greater sales volume, and unit costs go down. Conversely, if load factor deteriorates, unit costs go up.

"To my mind, the improvement of load factor through the addition of valley loads, and the corollary job of safeguarding against any deterioration of load factor which would result from loss of present loads, are currently the two most essential jobs of the industry."

Transition needed. "This trend of the past cannot continue indefinitely without serious disadvantage to the industry and to its customers. The com-

Competitive energy prices of large-volume industrial contracts



Gas could price itself out of the industrial market.

Industrial gas prices rose 40% in 6 years, while the cost of coal and electric power to industry showed almost no change. Industrial fuel-oil prices went up, then down again.

Problem: Find new, less-competitive markets to replace boiler use.

petitive price advantage of gas is disappearing. Competition is too keen to allow gas to expand, or even to retain its present markets, unless the rise in natural-gas prices is leveled off.

"The answer lies in the sales and marketing organizations of the industry.

"I see little possibility that average producer prices can be stabilized at present average levels if reserves sufficient for industry growth are to be forthcoming. We must face the fact that gas production is an increasing-cost business.

"The transmission and distribution segments of the industry have the potential to put into action a trend of stabilized or even decreasing unit costs, provided they recognize marketing as their major problem and devote their full and wholehearted attention to it."

The real challenge, says Conkling, is to fill in the summer valley load with a new market, such as air conditioning. This would give better utilization of capacity and reduce average unit costs. It would also offset any loss of industrial markets, such as power generation, which can be retained only at very low prices.

But this is not the whole answer, says Conkling. "The industry should be aggressive in the development of new high-value commercial and industrial uses for gas which will fit advantageously into its forum.

"The 1960's should see a transition from the precarious balance of space-heating sales in the winter and low-priced industrial sales in the summer, to firm year-around sales of a type to support, with a safe margin, whatever prices it may be necessary to charge.

"I think it is now time for intraindustry disputes to be settled and for all segments of the industry to present a united front.

"The challenge of competition, the need to develop new markets and to hold existing ones, is not exclusively a distributor and a pipeline-company problem. The challenge of a rising cost of natural-gas discovery and production is not exclusively a producer problem.

"Despite the fact that the industry is composed of individual companies, each of which must, and properly so, be concerned with its own individual interests, nevertheless I feel that the good of all requires a greater degree of common understanding. The problems would not be so great if they could be met in the spirit of cooperation over the conference table instead of in the regulatory and judicial forum."

Large industrial gas market

	Avg. price per M.c.f.	Per cent of total market
Electric generation	22.6	35.2
Chemical	27.0	10.7
Petroleum refining	20.6	9.4
Iron and steel	40.0	6.2
Nonferrous metals	24.7	6.0
Paper and products	25.5	4.6
Cement	25.3	4.6
Food processing	32.1	4.1
Glass	37.6	2.9
Clay products	33.7	2.8
Others	33.2	13.5
Average	26.9	.....

About 45% of total industrial sales are made at the lowest prices in the list for electric-power generation and petroleum refining — both for boiler fuel.

The other markets can command higher prices because, for the most part, the gas is used for processes where other fuels would be less satisfactory.

Not only is boiler fuel the least remunerative of the load-building markets, but its price cannot be raised much in most areas because of competition from other industrial fuels.

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FLAC

A new kind of Fluid Loss Additive for Cement that far surpasses anything previously offered

WHAT IT IS. FLAC* is an important new fluid loss control additive for Class A and E neat and Class A bentonite oil well cement systems. Technically, it is a high-molecular-weight, synthetic polymer. It is supplied in the form of a dry powder that is easily mixed into either cement or water.

ADVANTAGES include reliable squeezing or primary cementing—especially in porous, high temperature zones. FLAC is especially useful for permanent type and tubingless completions. Since excess cement can be reversed out before testing, this saves a round trip as well as expensive drilling-out. WOC time is held to a minimum.

WHAT IT DOES. When used in correct concentrations, FLAC drastically reduces fluid loss of the cement slurry over a wide temperature range and at high differential pressures. It is stable at both high and low temperatures and does not affect slurry and set cement adversely. Premature dehydration is prevented and the result is reliable thickening time in squeeze cementing and maximum fill-up in casing cementing.

To give some idea of just how efficiently FLAC reduces fluid loss, here are some representative figures taken from laboratory tests made under simulated well conditions.

These tests were conducted according to API procedures set forth in RP-10B, January, 1960. Slurry was first subjected to appropriate API test schedule in the pressure thickening-time tester. The time interval was equal to that required for slurry placement in a well. Then fluid loss tests were made on the slurry samples in a high-temperature, high-pressure tester. API cement filter screens were used at maximum cementing temperature and at 1,000 psi differential pressure.

Class of Cement	Percent Bentonite	Percent FLAC	Temperature (Degrees F)	API Thickening Time—Hours and Minutes	Fluid Loss at 1000 PSI cc/30 Minutes
A	0	0	113	2:30	800
A	0	1½	113	2:28	35
A	12	0	125	2:30	336
A	12	1½	125	2:40	34
E	0	0	213	1:40	1000
E	0	1	213	2:15	100
E	0	1½	213	2:50	50

AVAILABILITY of FLAC is limited until a new production plant can be put in full scale operation within a few weeks. In the meantime, operators are invited to contact Dowell for test results. In this way, they can take full advantage of material as soon as supplies become adequate. Call, write or wire the nearest Dowell office or station. Or contact Dowell, Tulsa 1, Oklahoma.

Services for the oil industry DOWELL

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Oil conservation in the classroom

...a study in applied political economy

In academic circles, the oil industry is too often approached from separate exclusive directions: economic, engineering, legal, and political. In a seminar on "Conservation Regulation in the Production of Petroleum" conducted at Southern Methodist University, these interrelated mutually dependent factors were considered together. The results: a broader appreciation of the many aspects of conservation on the part of those who participated in the seminar.

BY WALLACE FRANCIS LOVEJOY

. . . associate professor, department of economics, Southern Methodist University, Dallas. He graduated from William Rice Institute in 1950, received his master's degree at Southern Methodist, and his PhD from University of Wisconsin. Following a several-year stint of teaching, Lovejoy was for 2 years an economic analyst in the coordinating and planning department of Continental Oil Co. He returned to teaching last year.

Lovejoy has authored several articles, and currently is researching the sensitivity of the telephone industry to the business cycle, the economic aspects of oil and gas conservation legislation and regulation, and is writing a book on public-utility economics which will be published in several months by Prentice-Hall, Inc.

BACK IN THE DAYS of Adam Smith and David Ricardo, the subject we know today as "economics" bore the title of "political economy." Two things are implied in such a phrase: economics, and politics in its broadest sense. When economics is used in making policy decisions at the company level or at the local, state, or national government level, it becomes "political economy."

Last September, Southern Methodist University launched an unusual doctoral program in economics in that it uses an "interdisciplinary" approach which tends to bring economics back to the old concept of political economy. This means that PhD candidates will study in seminars where not only economic analysis and application is discussed but also where economics is related to business practices and problems, law, political science, history, and even as in the study of oil and gas, to engineering and geology.

Each year a seminar is held in the general area of "Industrial Organization and Public Regulation." This spring the topic chosen for study by the seminar was "Conservation Regulation in the Production of Petroleum." This topic is admirably suited for the interdisciplinary approach, since not only were there economic questions involved, but also serious business, legal, political, foreign-policy, social, and engineering questions.

In addition, here was a subject which was essential to the region and on which local outside speakers could be asked for help. This was a timely subject since the pricing, production, and distribution practices of the industry were undergoing close scrutiny and analysis without and within oil circles. Conservation was felt to be a good springboard from which discussion might take off in any of a number of directions. Finally, we felt that some interest might be stimulated among our graduate students to do research in the economics of the oil industry. SMU is admirably well situated for such research and we hope to encourage it. We hope the industry will encourage it also.

In addition to a number of graduate students in economics, the weekly 3-hour seminar included Dr. I. James Pikl, Jr., as chairman; Dr. Paul T. Homan and the author from the economics department, and Prof. Charles O. Galvin, of the school of law. From time to time, other faculty members and guests dropped in.

Orientation. Initial problem of the seminar was one of orientation. We decided at the outset that an attempt would be made to get a number of outstanding people from the industry and from groups interested in the oil industry. However, it was essential that everyone in the seminar have some common body of knowledge so as to be informed enough to discuss and ask questions. This briefing job was done by three members of the economics - department faculty, Professors Homan, Pikl, and the author.

Included in this orientation were (1) the structure, importance, and unique characteristics of the industry by Dr. Homan; (2) the economic theory of resource conservation and some applications to oil by Dr. Pikl; and (3) a review of the history of conservation, an analysis of the techniques used in oil conservation, and a discussion of the state and federal laws and regulatory bodies dealing with it by the authors.

These three papers laid the foundation for talks by a selected group of outside speakers. Taken as a group, they probably make up the greatest composite "political economist" the oil industry has ever seen. Included were two well-known petroleum economists, Dr. Robert G. James and Dr. Richard J. Gonzalez. There were three lawyers, two, Robert E. Hardwicke and Earl Foster, who have literally grown up with the oil industry and oil conservation, and one, Prof. Charles O. Galvin, who is well steeped in the intricacies of oil tax law. Finally, there were two petroleum engineers, Texas Railroad Commissioner William J. Murray who must be a judge and economist as well as a technical expert, and H. M. Sherin, well known as an outstanding reservoir engineer.

Oil economist. The first speaker was Dr. Richard J. Gonzalez, coordinator of finance and economics of Humble Oil & Refining Co., whose talk was entitled "Economics of Petroleum Production and Conservation." He directed his remarks to (1) the risks of oil exploration, (2) the

Checklist of State Laws Dealing With Oil and Gas Conservation*

State‡	Conservation Tool						
	Prevent Waste	Correlative Rights	Market Demand	Ratable Take	Well Spacing	Unitization—Drilling†	Unitization—Production†
Alabama	Y	Y	N	N	Y	Y	Y
Alaska	Y	N	N	N	Y	Y	Y
Arizona	Y	Y	Y	N	Y	Y	N
Arkansas	Y	Y	N	N	Y	Y	Y
Colorado	Y	Y	N	Y	Y	Y	N
Florida	Y	Y	Y	N	Y	Y	Y
Georgia	Y	Y	N	N	Y	Y	G
Illinois	Y	N	N	N	Y	Y	N
Indiana	Y	N	N	N	Y	Y	Y
Kansas	Y	Y	Y	N	N	N	N
Louisiana	Y	N	Y	G	Y	Y	G
Maryland	N	N	N	N	Y	N	N
Michigan	Y	N	Y	Y	Y	Y	Y
Mississippi	Y	Y	N	N	Y	Y	N
Montana	Y	N	N	N	Y	Y	N
Nebraska	Y	Y	N	Y	Y	Y	N
Nevada	Y	N	N	Y	Y	Y	Y
New Mexico	Y	Y	Y	Y	Y	Y	N
N. Carolina	Y	Y	Y	N	Y	Y	N
N. Dakota	Y	N	Y	N	Y	Y	N
Oklahoma	Y	N	Y	Y	Y	Y	Y
Oregon	Y	N	N	N	Y	N	N
S. Dakota	Y	N	N	N	Y	Y	N
Tennessee	Y	N	N	N	Y	Y	N
Texas	Y	N	Y	Y	Y	N	N
Utah	Y	N	N	N	Y	Y	N
Washington	Y	N	Y	N	Y	Y	Y
Wyoming	Y	N	N	N	Y	Y	N
California‡	G	N	N	N	Y	N	S

Notes:
* Adapted from a "Summary of Conservation Statutes, with References," compiled by Paul H. Long, Attorney, Carter Division, Humble Oil & Refining Co., January, 1960, mimeo.
† Unitization refers to compulsory unitization at the discretion of the Commission.
‡ California has no prorationing by a state agency. Most production is supervised by the Conservation Committee of California Oil Producers and is at MER.
N—No G—Yes, but applies only to gas
Y—Yes S—Yes, but only to avoid or correct surface subsidence.

peculiarities of oil production, (3) the importance of oil and gas to economic progress and national security, (4) the economic consequences of conservation, and (5) the depletion allowance and profits.

Some lively discussion ensued on market-demand prorationing, a topic which was to recur almost every week in one form or another. The question was raised, does market demand prorationing "maximize" social benefits in the long run? The oil industry's answer is yes, although such a concept is difficult to measure and depends on several basic assumptions. One of the most important assumptions is what will happen to technology and to fuel supply and demand in the future.

There seemed to be general agreement that production at MER today would not only break prices, but would actually lower ultimate recovery of the nation's reserves and deter new exploration and development.

It is possible that such a course of action would be the best, from an over-all public viewpoint? If crude prices fell, presumably product prices would fall also, and this would benefit consumers. The industry argues that these low prices are short-lived, and eventually a shortage of oil would develop which would raise prices. How, it was asked, could this occur with the tremendous excess producing capacity that exists in the world today and which is expected to exist for many years? The reply is, do we want to be dependent on foreign oil supplies in the event of war or some other crisis such as the closing of the Suez.

Thus, we come down to the argument that, in part, we need market-demand prorationing for national-defense purposes; that it is a necessary cost society must pay for the ability to be self-sufficient. Thus, **political** economy must be used for analysis rather than merely economics. Political factors such as national defense may weigh heavily in decisions concerning domestic oil consumption and production. Other aspects of this argument were picked up, as we shall see, by later speakers.

Law professor. The second speaker was Prof. Charles O. Galvin, professor of law at the SMU school of law. An authority on tax law, he was asked to speak on the relationship of federal tax provisions to oil production and conservation. Professor Galvin had testified on the subject of deductions for percentage depletion and exploration and development costs before the House ways and means committee in the fall of 1959. He gave the seminar his personal observations and impressions of the congressional hearing.

The basic question raised in Professor Galvin's testimony was "The fact that a favorable tax climate has made possible a better performance for a specific unit would not go far enough. The question is: Has such enhanced performance redounded to a greater benefit for the whole economic community than the community sacrifice which may be involved in the tax preference?"

Thus, the criteria for an acceptable tax policy are much the same as for a proper conservation policy. In fact, the policies are related and influence each other. Certainly current tax treatment of the oil industry enables the industry to explore and develop more rapidly than would be the case if these tax provisions did not exist. Is this in the best interest of conservation?

Taken in one sense there is clearly a conflict, i.e., conservation means slowing down exploitation or pushing it into the future, while the special tax provisions stimulate exploitation. On the other hand, these two things are complementary in that conservation can occur only if there is something to conserve; therefore, anything which adds to the stock of what we are consuming actually adds to conservation.

Railroad commissioner. Texas Railroad Commissioner Murray was asked to discuss the mechanics and rationale of market-demand prorationing. He not only covered this, but also skillfully handled topics ranging from political pressures on the Texas Railroad Commission to the pros and cons of prorating water-flood production in Texas. Perhaps in his discussion more than in any other during the semester, the seminar was treated to a blending of economics, engineering, law, and state, national, and international politics.

The question was raised whether

THE QUALITY OF THINKING

The mind of Galileo—keenly analytical, superbly trained—led him to founding the science of experimental physics, which, centuries later, is revealing the mysteries of space. It is self-evident by his achievements that Galileo's mind reached a level of quality far above ordinary standards of excellence.

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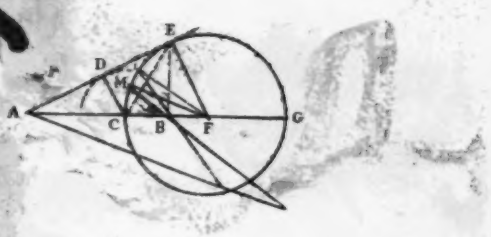

"The knowledge of a single fact through a discovery of its causes prepares the mind to understand and ascertain other facts..."
Galileo

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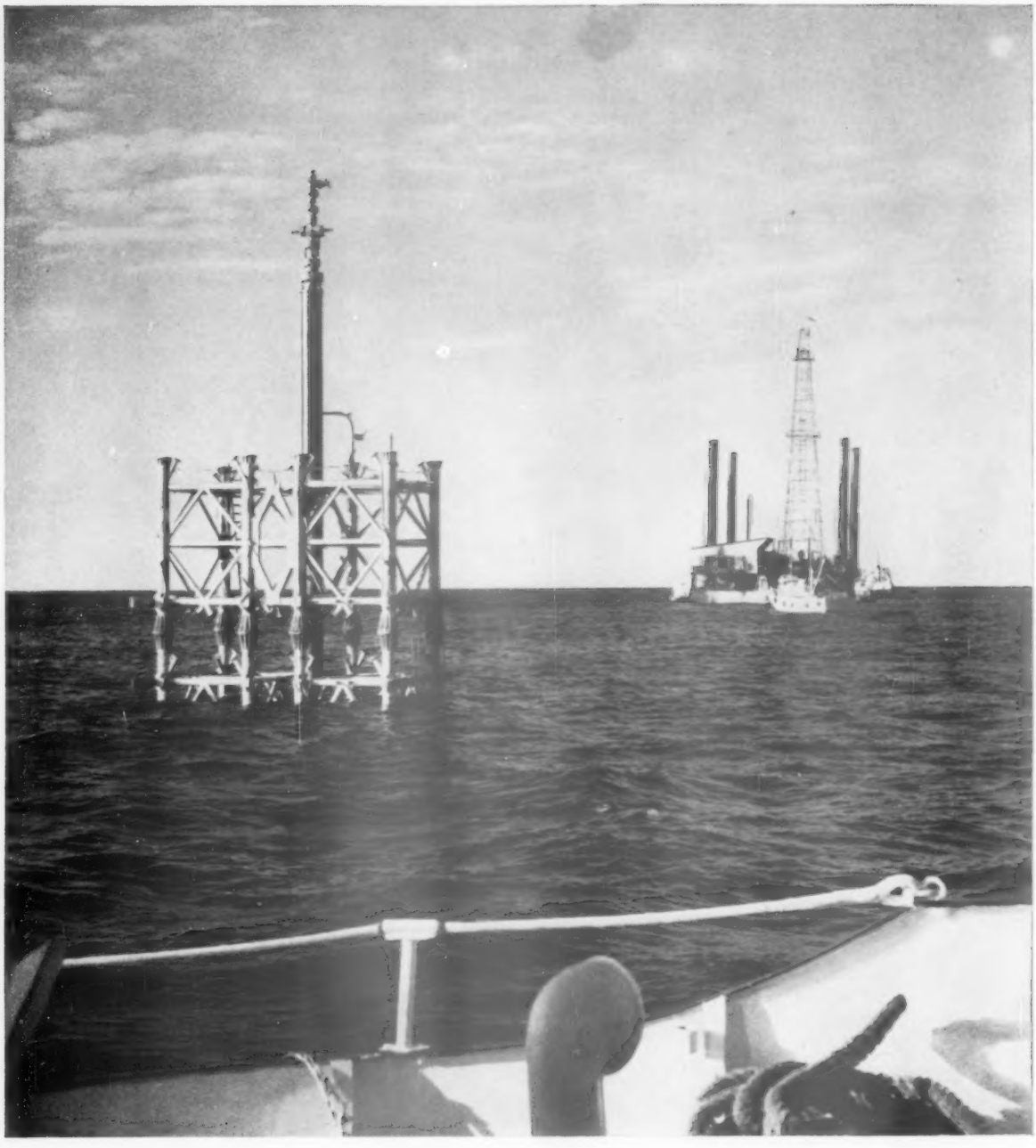
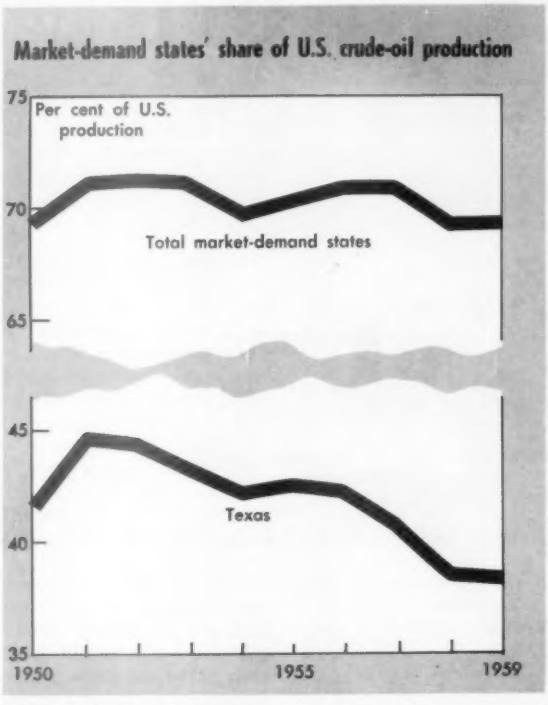


ABU DHABI

A well head in the Persian Gulf. In the background, the barge "Adma Enterprise" which is currently drilling beneath the waters of the Gulf. The results are sufficiently encouraging to warrant the preparation of facilities for regular production. This stage should be reached by mid-1962.

BP



MARKET-DEMAND STATES account for about 70% of all crude production in this country. Texas' portion of the total has been declining but still accounts for more than half the prorated oil.

there was full industry support for conservation measures throughout the nation. The answer was no, not in the sense that while the general philosophy of conservation was acceptable to most, there was no agreement on the methods of achieving the desired ends. Look at the number of court cases testing every new wrinkle in regulation and it becomes apparent that conservation has been a hard-fought battle. He also pointed out that while some firms comply willingly with Texas regulations, they use extremely wasteful practices in some other states with less-stringent regulation. This led to a discussion of whether states without market-demand laws were appropriating more than their share of

One of the most interesting parts of Murray's discussion dealt with the controversial exceptions to "Rule 37." Some students, who were by now beginning to talk with assurance about oil problems, were critical of the commission's handling of well spacing. They pointed out the tremendous waste to the industry and to society resulting from close spacing. Murray carefully analyzed the legal, economic, and political aspects of this policy.

Basically the problem is one of protecting correlative rights in the field. The courts have set down two possibly conflicting principles: (1) a landowner is entitled to the oil under his land, and (2) a landowner is entitled to drill on his land and recover his costs and a reasonable profit, regardless of the acreage involved. Pooling and unitization can take care of the first, but the second principle must necessarily cause someone to lose some of his rights.

A week was devoted to the scientific aspects of oil production. The seminar visited the production laboratory of Sun Oil Co. in Richardson, Tex., where the group saw how digital and analog-computer techniques were used to analyze and forecast reservoir characteristics and behavior. Here the science of oil recovery was introduced to give the student an idea of the enormity and complexity of the task of knowing what is to be regulated.

Another oil economist. Next outside speaker was Dr. Robert G. James, economist in the planning and analysis department of Socony Mobil Oil Co. in New York and former economist for Continental Oil Co. Dr. James had a unique story to tell in that he participated in the preparation of much of the economic evidence for the Tulsa Case.

This case presents an interesting study in oil-price determination, of the role of conservation regulation in pricing, and of the problems of handling legitimate, acceptable pricing practices in public relations. Dr. James outlined to the seminar the type of planning and work that goes into the preparation of a major antitrust suit. One of the most interesting aspects of this discussion was a comment by one student that for an industry such as oil, it is virtually impossible to admit that the desire for more profit ever leads to a price increase. Yet the profit motive has been and is the acceptable moving force in the free-enterprise system, according to economic theory. Political economy once again comes to the fore.

In the Tulsa Case every conceivable reason but profits was examined by the oil industry to explain the price increases, including cost increases, inflation, increased difficulty in finding oil, and local shortages. It was, indeed, interesting to see how scrupulously the industry avoided the profit motive in its discussion.

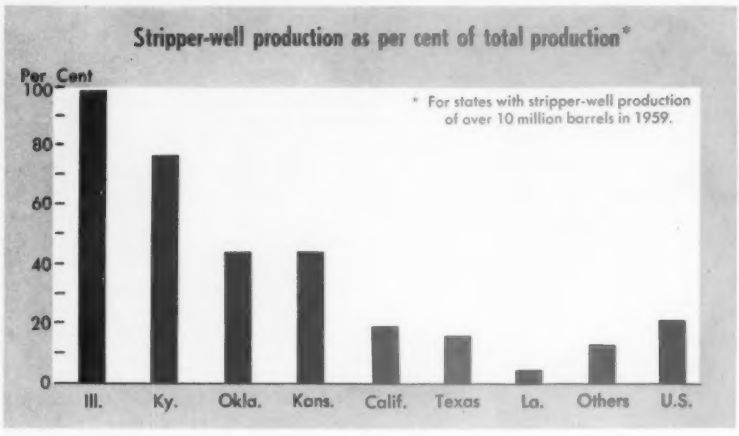
The impact of conservation regulation took an interesting twist in the Tulsa Case discussion. The posted pricing system for crude was the basic thing under attack in the case, since it is through this system that prices found in various fields and posted by various companies automatically move together. Yet an indictment of the pricing system is at the same time an indictment of conservation regulation, because prices move when supply and demand conditions change, and regulation keeps a firm grip on supplies available in the various fields.

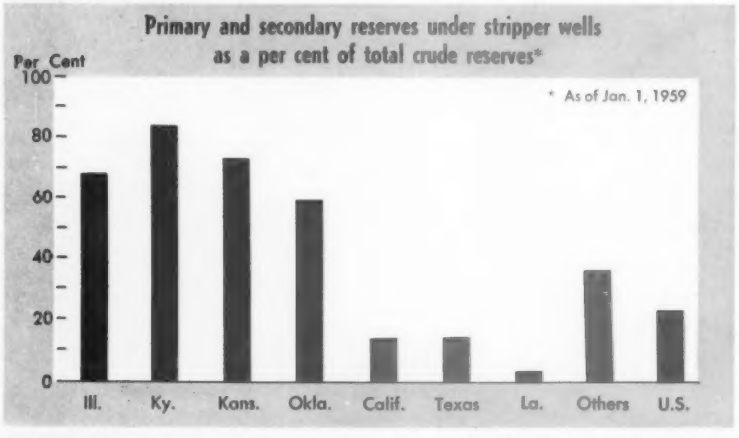
Thus, prorationing, in a sense, fosters unconscious parallel price quotations because it tries to maintain parallel supply and demand pressures.

IOCC counsel. The next speaker was perhaps the most ardent advocate of oil conservation at the state level. This was Earl Foster, general counsel for the Interstate Oil Compact Commission who spoke on "The Role of the IOCC in Oil Conservation." Interstate compacts are fairly common in the United States but their makeup, functions, and limitations are surprisingly little known. This is true of the IOCC both in and out of oil circles.

Questions were raised as to whether the Compact functioned informally as a price-fixing agent or at least as a meeting place for industry and state officials to agree on production and prices. Foster carefully pointed out the fallacies in such a statement and mentioned that the Attorney General of the United States had given the IOCC a clean bill of health in all matters pertaining to the antitrust field.

The question then arose whether or not market-demand prorationing is





STRIPPER-WELL PRODUCTION accounts for about 20.9% of the U. S. total, but ranges from over 99% of production in Illinois to about 4% in Louisiana. Stripper-well reserves represent almost 36% of the nation's total.

necessary and desirable. The students probing this area were setting a friendly trap for the speaker who knowingly took the bait and agreed that market demand was an appropriate criterion for prorationing. Then why not have a federal law which provides for uniform standards of conservation in all states, rather than have the somewhat sloppy situation in which some states prorate, others do not, and others do so in a half-hearted way?

Foster agreed that state control in this area was not perfect and that there was still much to be done. He felt, however, that at least the shortcomings of the state systems were known, while federal control was an unknown quantity and less likely to be adaptable to the needs of individual states. Since the states have done a fine job thus far in conservation, why change?

Conservation dean. The seminar next was pursued, with Robert E. Hardwicke, of Fort Worth, often termed dean of oil-conservation law, the arguments for and against market-demand prorationing. Hardwicke was quick to point out that buyers of crude oil, in the final analysis, determine the amount of oil prorated. In situations in which one state loses and another gains allowables, it is largely because of shifts in crude-oil buying, and there is little a state regulatory body can do to change the situation.

States, from time to time, have set allowables significantly above purchasers' nominations, and the result has been buyer or pipeline prorationing rather than increased production. Such a situation creates inequities among producers, since not all buyers prorate equally. If they did, you might as well have a reduced state allowable and prevent inequities. Attempts by states to require buyers to purchase all that is allowed has driven buyers from some states and resulted in court cases in some instances.

A final point made was that conservation should aim at maximizing the social benefits to the producing state and not necessarily the social benefits of the nation as a whole. While it was agreed that the two may coincide, some members felt the nation rather than the state should be the primary beneficiary.

Engineer. Final presentation to the seminar was made by H. M. Shearin, manager of domestic operations, engineering and consulting department, Core Laboratories, Inc., of Dallas, who was assisted by Joe Ed Smith. Shearin took up the very critical subject of "Conservation and Secondary Recovery." Once again it was apparent that economics must be supplemented with engineering and legal principles to be meaningful.

After demonstrating with a fascinating model the enginering principles involved in secondary recovery from various types of reservoirs, Shearin proceeded to discuss the economic aspects of what he called the "second crop." The questions centered on the subject of secondary recovery versus new exploration as a source of new reserves.

It was brought home to the group that if a company had a certain amount of money to invest in search of new reserves, it should seriously consider secondary-recovery techniques. The risks are, in many instances, lower, and the possible returns are often much greater. This trend is apt to continue as domestic reserves get harder and harder to find.

Students fired loaded questions at Shearin on the currently hot issue of prorating water floods. The speaker presented both sides of this argument, pointing out that undoubtedly there were some situations in which operators abused the water-flood production privileges, but that there were probably an equal number of situations in which the incentive system was essential to the economical operation of a water-flood project. The Railroad Commission would have to decide each case on its own merits.

The faculty at SMU was exceedingly pleased by the results of the seminar. The speakers had performed marvelously, had prepared carefully, and had answered questions frankly. The industry can well be proud of them. The students are still thinking about the "political economy" of oil conservation. Several speakers, on the other hand, are thinking about some of the questions they could not handle as well as they might have. In this respect the discussions were mutually beneficial. A hearty public thanks is due each of the speakers.

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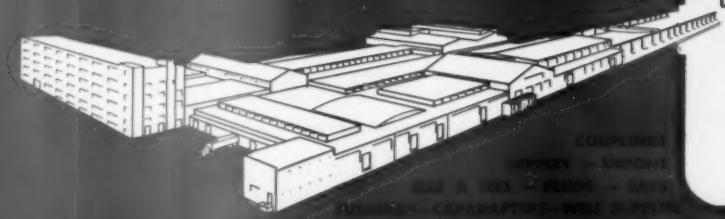
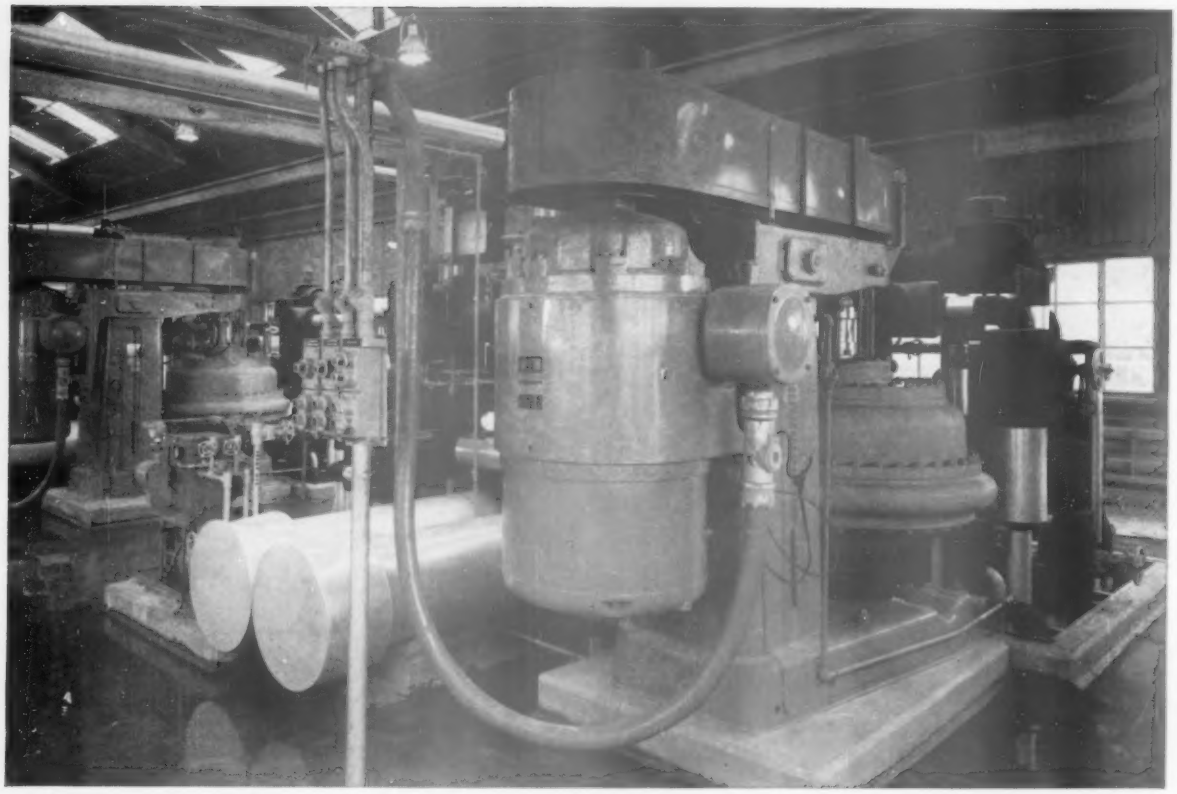


CAPITOL MANUFACTURING CO.
DIVISION OF HARSCO CORP.
COLUMBUS, OHIO

at Phillips Chemical Company:

MERCO® PRESSURE CENTRIFUGES

solve catalyst removal in linear polyethylene production



Volume production of MARLEX®, a high quality linear polyethylene made by Phillips Chemical Company under its own process, depends in large measure upon a fast, economic method of separating the catalyst from the polymer.

Key to this vital purification step is the Merco Pressure Centrifuge, which effectively removes foreign particles as small as 0.5 micron by applying forces thousands of times higher than gravity. Each centrifuge delivers an effluent product of less than 8 ppm impurity at capacities of more than 200 gpm.

Merco Pressure Centrifuges are the first and only units of their type continuously effecting a polyethylene-solid catalyst removal on a high production commercial basis. At Phillips—and in several other plants licensed under the Phillips process—these units are operating around the clock 7 days a week. Many installations schedule only 2 Merco shutdowns per year for maintenance and examination.

Merco Continuous Pressure Centrifuges are revolutionizing many operations in processing industries where high speed, controlled separation is a key to quantity production. Laboratory or commercial scale units are available for trial or demonstration on your products. For information, write Dorr-Oliver Incorporated, Stamford, Connecticut.

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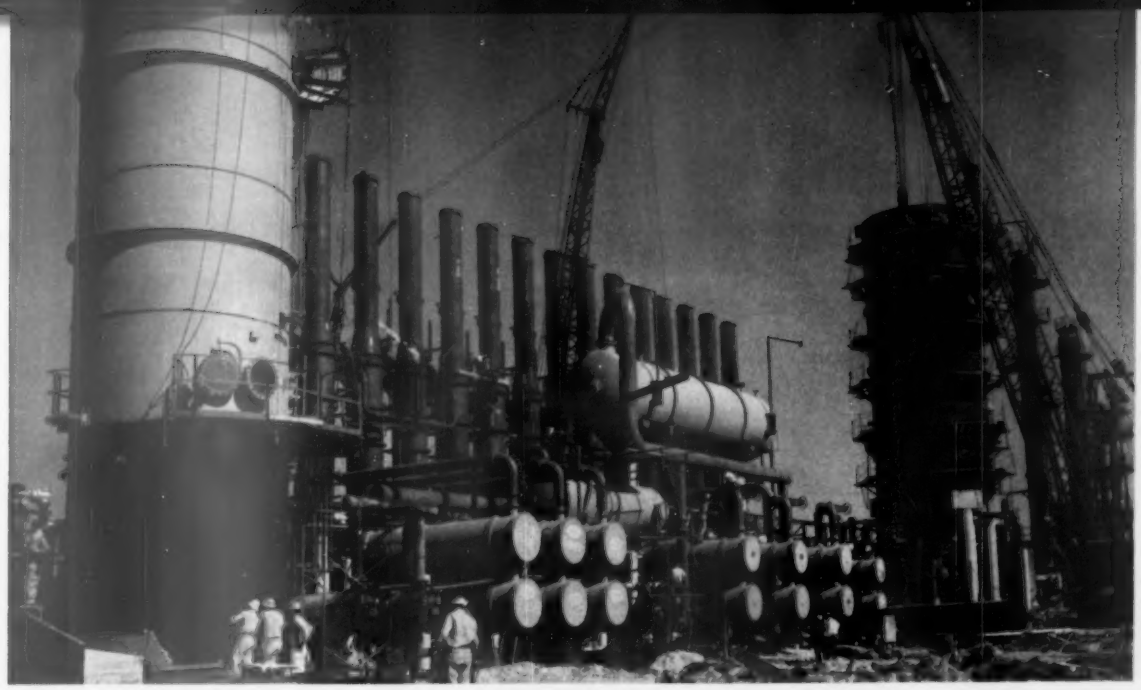

WORLD'S LARGEST high-purity ethylene plant is being built by Mobil Chemical Co. at Beaumont, Tex. Capacity will be 380,000,000 lb. per year when completed first quarter 1961. The photo shows some of the unit's partially completed towers, furnaces, and exchangers.

Plant Construction at Midyear

Emphasis is on petrochemical expansion

- New survey on refining, field-processing, and petrochem construction shows more than 200 projects under way or planned in the United States and Canada, with more than half in petrochemicals.

BY ROBERT B. BIZAL
Editorial Research

THE UNITED STATES and Canada are not exceptions to the current world-wide boom in the expansion of petrochemical capacity. Construction in this field far outstrips refining or field-processing building programs.

The Journal's midyear construction report shows 122 petrochemical plants under way or planned. This includes 106 in the U. S. and 16 in Canada.

Some of the projects are giant installations. For example, Mobil Chemical Co. is building the world's largest ethylene plant at Beaumont, Tex.

The new projects run the gamut as to types of products, but there is still a great deal of emphasis on new facilities for polyethylene and polypropylene, with more than 15 such projects.

The construction survey shows a sudden rash of petroleum naphthalene units, including projects by Sun Oil Co., Tidewater Oil Co., Collier Carbon & Chemical Co., and Ashland Oil & Refining Co.

In refining, construction is rocking along at about the same level of activity as last year. There are 52 projects in the U. S. and Canada, but some are still merely in the long-range planning stage.

Of the 52 refining projects, 41 are in the U. S. and 11 in Canada, and most of them will not add to total crude capacity.

The biggest project is American Oil Co.'s new crude unit at Texas City. It will have capacity of 150,000 bbl. per day and will replace existing units.

New refineries actually under way include the Standard Oil Co. of California plant in Hawaii, and the Canadian Oil Companies, Ltd., refinery in Alberta's Innisfail area. Signal Oil & Gas Co. is rebuilding its fire-ravaged Signal Hill, Calif., plant.

Of the 36 new field-processing projects, 27 are in the U. S. and 9 in Canada.

These include such big plants as Humble Oil & Refining Co.'s King Ranch, Tex., plant; Goliad Corp.'s Vermilion Parish, Louisiana, project; and Runnels Gas Products Corp.'s Eunice, La., project.

Following is a complete rundown of domestic plant construction:

Refineries building or expanding

AMERICAN OIL CO., Texas City, will replace present units with a 150,000-bbl. per day crude unit, a 47,000-bbl. cat cracker, and a 14,600-bbl. alkylation unit. Crude-charging capacity will be increased only by 10,000 bbl. daily. M. W. Kellogg Co., New York, has contract for crude unit and cat cracker.

BRITISH AMERICAN OIL CO., LTD., Calgary, Alta., is expanding crude capacity from present 7,500 bbl. per day to 10,000 bbl., installing a 3,500-bbl. catalytic hydrogen-treating unit (hydrodesulfurization) with full-range naphtha as feed, and expanding catalytic reforming capacity and condensate-handling facili-

ties. Instrumentation and control systems will also be modernized. Completion expected fall 1960. Fluor Corp. of Canada, Ltd., Toronto, has contract for the hydrodesulfurization unit.

At Edmonton, British American is increasing capacity from present 8,500 bbl. per day to 13,500 bbl., with completion expected late 1960.

CANADIAN KODIAK REFINERIES, LTD., plans to build a refinery at The Pas, Man.

CANADIAN OIL COMPANIES, LTD., will complete its new refinery in the Innisfail area, Alberta, in fall 1960. Crude capacity will be 4,400 bbl. daily. Facilities will include a 1,860-bbl. per day Platformer and a 1,860-bbl. Unifiner, using straightrun naphtha.

CENTURY REFINING CO., Shallow Water, Kans., was scheduled to complete a 3,000-bbl. Thermofor unit and an 800-bbl. HF alkylation unit in mid-1960. Litwin Engineering Co., Wichita, Kans., is contractor.

CHEMOIL CORP., plans to build a 40,000-bbl. refinery between New Orleans and Baton Rouge, La., with completion by January 1962. Lummus Co., New York, has design contract.

CONSUMERS' CO-OPERATIVE REFINERIES, LTD., Regina, Sask., is adding a 3,000-bbl. Platformer and a 6,000-bbl. distillate Unifiner, with completion by Procon (Canada), Ltd., Toronto, December 21, 1960.

DX SUNRAY OIL CO., Tulsa, is building a new MEK solvent-dewaxing and deoiling unit to replace existing solvent-dewaxing unit and wax-press units. Completion by Foster Wheeler Corp., New York, is scheduled September 1960.

ESSO STANDARD DIVISION, Humble Oil & Refining Co., Baton Rouge, La. was scheduled to complete a 1,760-bbl. unit for wax in July 1960, with Nichols Construction Co., Inc., Baton Rouge, contractor. Lube-oil producing capacity will be increased from 10,900 to 12,800 bbl. daily. One phase, involving 500-bbl. capacity, was scheduled for completion in July 1960 by Nichols, and the additional 1,400-bbl. capacity will be completed by the Esso staff in December 1960.

At Bayonne, N. J., Esso will increase crude-charging capacity from 28,500 to 32,000 bbl. daily and vacuum capacity from 15,000 to 16,100 bbl. daily. Bechtel Corp., San Francisco, has contracts with completion scheduled fourth quarter 1960.

FARMERS UNION CENTRAL EXCHANGE, INC., Laurel, Mont., will boost capacity from 20,000 to 25,000 bbl. daily, with completion by staff March 1961. Fresh-feed capacity of cat cracking operation will be increased from 8,000 to 10,000 bbl. daily, and recycle capacity will be increased from 2,000 to 5,000 bbl.

FLORIDA OIL & REFINING CO. (Frontier Refining Co.) has acquired a deepwater site at Jacksonville, Fla., and plans a 10,000-bbl. refinery. Construction has been delayed until supply of crude can be assured during crucial first year of operation.

GOLDEN BEAR OIL CO., Oildale, Calif., is studying feasibility of adding a 1,000-bbl. catalytic hydrogen treating unit for lubes. Such a project would not be undertaken before 1962 at the earliest.

GOLDEN EAGLE REFINING CO., Torrance, Calif., was recently acquired by the British company, Ultramar Co., Ltd., which plans to jump capacity from present 9,000 bbl. to 30,000 bbl. per day.

GOLDEN EAGLE REFINING CO. OF CANADA (newly organized subsidiary of Ultramar Co., Ltd.) will build a 5,000-bbl. per day refinery at St. John's, Newfoundland, the first for that province.

GULF OIL CORP. is planning a new refinery near Charleston, S. C.

HESS TRADING & TRANSPORT, INC., Sewaren, N. J., plans to add a 30,000-bbl. fluid cat cracker, 15,000-bbl. Unifining unit, a 40,000-bbl. vacuum unit, and 2,500-bbl. sulfuric alkylation unit.

HUMBLE DIVISION of Humble Oil & Refining Co., Baytown, Tex., will increase vacuum capacity from 157,100 to 179,000 bbl. daily by March 1961, with Humble crews doing the job. Catalytic hydrogen treating will be increased 6,500 bbl. daily to 82,300 bbl., with completion by January 1961.

HUSKY HI-POWER, INC., Cody, Wyo., will increase capacity from 7,200 to 9,000 bbl. daily in January 1961. A 2,500-bbl. gas-oil cracking unit, and a 700-bbl. sulfuric acid alkylation unit also will be added by January 1961.

IMPERIAL OIL LTD., Sarnia, will add a 32,000-bbl. per day Hydrofiner to treat furnace oils.

LOUISVILLE REFINING CO., Louisville, will increase capacity from 11,000 to 16,200 bbl. daily by September 1960, with Myers Construction as contractor. Fluid cat cracking fresh-feed capacity will be increased from 4,000 to 5,000 bbl. daily, and recycle will be hiked from 3,200 to 4,200 bbl. daily.

MOBIL OIL CO., Beaumont, Tex., will add a delayed-coking unit to convert 20,000 bbl. daily of heavy oil to lighter ends, with completion scheduled spring 1961.

MONARCH OIL CORP. plans to modernize the 5,000-bbl. refinery at Signal Hill, Calif., owned by Olympic Refining Co. Facilities will be installed to produce diesel fuel, solvents, kerosine, lubricating-oil stocks, and asphalt.

NAPH-SOL REFINING CO., Muskegon, Mich., will add a 5,000-bbl. per day Unifining unit. Completion is tentatively set for 1961.

PACIFIC STATE OIL CO. is reopening a 2,000-bbl. refinery at Dickinson, N. D., formerly owned by Queen City Oil & Refining Co., for production of jet fuel. Reopening was scheduled in mid-1960.

PACIFIC SUPPLY COOPERATIVE has a finished products terminal at Vancouver, Wash., with ultimate plans for a new refinery.

PETROLEUM SPECIALTIES, INC., Flat Rock, Mich., will add 2,500 bbl. daily of vacuum capacity.

PHILLIPS PETROLEUM CO., Borger, Tex., will add a 25,000-bbl. heavy oil catalytic cracking unit, with completion in 1961. Contractor is M. W. Kellogg Co., New York.

REGENT REFINING (CANADA), LTD., Port Credit, Ont., is increasing calendar-day capacity from 20,000 to 26,000 bbl. daily in 1960. A new 4,700-bbl. Platformer will replace an existing 2,100-bbl. unit in 1960. Contractor for the latter is Catalytic Construction of Canada, Ltd., Sarnia, Ont.

RICHFIELD OIL CORP. plans to build a $50-million plant at Everett, Wash., with probable completion in 1965.

SHELL OIL CO., Houston, will install its first lubricating-oils Hydrofining unit, using Shell trickle phase process to remove sulfur and other trace components from lube-oil stocks.

At Wood River, Ill., Shell will increase Platforming capacity from 43,000 to 68,000 bbl. daily, with completion in December 1960. Arthur G. McKee & Co., Cleveland, has contract.

SHELL OIL CO. OF CANADA, LTD., may build a 20,000-bbl. refinery at Bronte, Ont., near Toronto.

The company is also considering construction of a refinery near Calgary, Alta., and has taken option on a 310-acre site southeast of Calgary.

SIGNAL OIL & GAS CO. has acquired the 19,000-bbl. fluid catalytic cracking unit at the closed American Oil Co. refinery at Destrehan, La., and is moving it to Houston. Brown & Root, Inc., Houston, has contract, and completion is scheduled early spring 1961. Signal's Houston Division is the former Eastern States Petroleum & Chemical Corp. The new unit will boost fluid cat cracking capacity to 39,000 bbl. daily.

Signal's Bankline Oil Co. refinery at Bakersfield, Calif., will add 10,000 bbl. to vacuum distillation capacity; an 8,000-bbl. Thermofor unit with recycle capacity of 8,000 bbl.; and a 500-bbl. catalytic polymerization unit. Completion by Ralph M. Parsons Co., Los Angeles, is scheduled October 1, 1960.

Signal will reopen the fire-ravaged Hancock refinery at Signal Hill, Calif. When rebuilding is completed, capacity will be 50,000 bbl. daily. The company hopes to be processing 15,000 to 20,000 bbl. daily before the end of 1960.

SOUTHLAND CO. has purchased a site at Black Point, Fla., for a proposed $8-million, 15,000-bbl. refinery.

STANDARD OIL CO. OF CALIFORNIA will complete its 32,000-bbl. per calendar day crude unit near Honolulu, Hawaii, in October 1960. Scheduled for completion in mid-1962 are a 13,000-bbl. fluid at cracking unit, with recycle of 13,000+ bbl.; a 3,800-bbl. sulfuric acid alkylation unit; a 1,350-bbl. C_4 isomerization unit; and capacity to produce 500 bbl. of basic asphalt. Bechtel Corp., San Francisco, and Hawaiian Dredging & Construction Co. have contracts.

Standard Oil Co. of California also plans to build a $75-million, 60,000-bbl. plant near Everett, Wash.

STANDARD OIL CO. (IND.), Whiting, Ind., will increase fluid cat cracking fresh-

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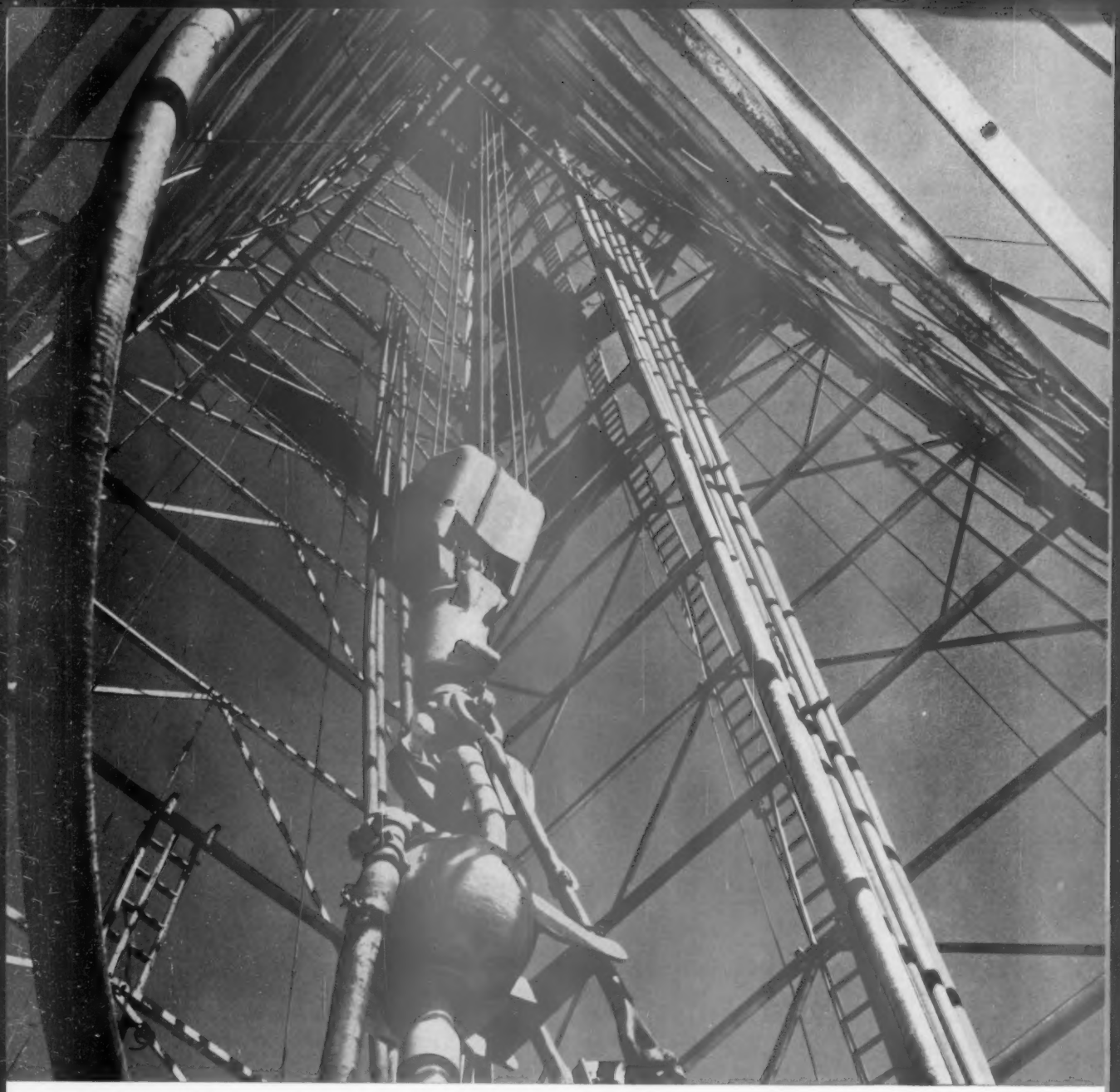

Bethlehem Wire Rope at Work in North Goldsmith Field. This photograph was taken during drilling of a 13,000 ft well in the North Goldsmith Field, Ector County, Texas, by Falcon-Seaboard Drilling Company. At the time of the picture, the drilled depth was 7,000 ft. The Bethlehem wire rope used here is 1¼ in. 6 x 19 Seale Formset Purple Strand, right lay, with IWRC. As usual, the Bethlehem rope provided low cost, dependable service. And that's one good reason why it is used so extensively throughout the oil country.

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feed capacity from 83,000 to 93,000 bbl. daily, with completion by company forces in 1960. In 1961, a new 11,400-bbl. sulfuric acid alkylation unit will replace the existing 5,000-bbl. unit. Bechtel Corp., San Francisco, has contract.

At Wood River, Ill., Indiana Standard will replace existing 170-bbl. catalytic polymerization unit with a new 550-bbl. unit, with completion expected September 15, 1960. Procon, Inc., Des Plaines, Ill., has contract.

STANDARD OIL CO. OF OHIO, Lima, Ohio, is adding a $1,500,000 carbon monoxide boiler, with completion in December 1960.

SUN OIL CO., Toledo, will start construction of a propane deasphalter in August 1960 with completion scheduled next spring by Foster Wheeler Corp., New York, contractor. The 10,500-bbl. per day unit will boost cat feed stock and reduce residual-fuel production.

SUNSHINE STATE REFINERIES, LTD., plans to build a 25,000-bbl. refinery in the Tampa, Fla., area, with the date yet to be determined.

SUPERTEST PETROLEUM CORP. is considering construction of a new refinery at London, Ont.

TEXACO INC., Casper, Wyo., will install a new Hydrotreating unit, with capacity of 4,000 bbl. per calendar day. Completion set for January 1, 1961.

UNION OIL CO. OF CALIFORNIA has purchased 2,240 acres 33 miles north of Seattle, as possible refinery site.

At the company's Los Angeles refinery at Wilmington, Calif., a 15,000-bbl. Sinclair-Baker cat reforming unit will be built, and Unifining capacity will be increased from present 14,000 bbl. to 56,000 bbl. daily. Completion of the projects by C. F. Braun & Co., Alhambra, Calif., is scheduled last half 1960.

UNITED REFINING CO., Warren, Pa., will go on stream with a new 1,100-bbl. sulfuric acid alkylation unit in November 1960. Cost will be $1,300,000, and contractor is M. W. Kellogg Co., New York.

UPPER PENINSULA OIL REFINERY, INC., is going on stream at its newly reassembled 1,500-bbl. crude skimming plant at Rapid River, Mich.

Petrochemical-plant construction

ALLIED CHEMICAL CORP., Baton Rouge, La., plans to add a fluorocarbon plastics plant, with first production based on chlorotrifluoroethylene.

At Hopewell, Va., Allied is planning expansion of caprolactam facilities.

At Moundsville, W. Va., ultrapure methane (99.99%) will be produced from methane-rich natural gas.

At Orange, Tex., Allied plans to complete a new high-density polyethylene plant late 1960.

At South Point, Ohio, the company will expand methanol capacity 50% and formaldehyde capacity 35%, with completion early 1961.

At Tonawanda, N. Y., the company plans to expand polyethylene facilities in 1960.

Another plant to produce fine-denier nylon yarn is in the planning stage, with possible site in Virginia.

AMOCO CHEMICALS CORP., Joliet, Ill., will construct semiworks for production of trimellitic anhydride, with completion in 1961.

ASHLAND OIL & REFINING CO., Catlettsburg, Ky., is building new facilities to produce 75,000,000 lb. per year of naphthalene and 15,000,000 gal. per year of benzene, with completion February 1961. Badger Manufacturing Co., Cambridge, Mass., has contract.

AVISUN CORP. (Sun Oil Co. and American Viscose Corp.) has also announced plans to build facilities for production of 100,000,000 lb. per year of polypropylene somewhere in the eastern part of the U. S., with site not yet announced. Bechtel Corp., San Francisco, has engineering contract. The new plant will cost several million dollars.

BORDEN CHEMICAL CO. is building facilities at Fremont, Calif., to produce 25,000 tons per year of resin and 22,500 tons per year of formaldehyde.

At Illiopolis, Ill., Borden is building a 40,000,000-lb. per year polyvinyl chloride plant, with completion by end of 1960.

BRITISH AMERICAN OIL CO., LTD., Montreal East, Que., will install a Udex aromatics extraction unit for production of benzene, with provision for future production of other aromatics. Construction will start fall 1960, with completion before July 1, 1961.

BROCKVILLE CHEMICALS, LTD., plans to complete a petrochemical plant at Maitland, Ont., by spring 1961, for production of synthetic ammonia, hydrogen, nitrogen solutions, ammonium nitrate, and others, with natural gas from Alberta as raw material.

CABOT CARBON CO. OF CANADA, LTD., will expand carbon-black capacity at Sarnia, Ont., by late 1960.

CANADIAN CHEMICAL CO., LTD., is expanding facilities at its Edmonton, Alta., plant, which produces formaldehyde, methanol, acetic acid, pentaerythritol, and solvents. Completion scheduled early 1961.

CARWIN CO. is building facilities at La Porte, Tex., to produce 1,000,000 lb. per year of isocyanates.

CELANESE CHEMICAL CO., Division of Celanese Corp. of America, is increasing capacity of its Houston plant from present 40,000,000 lb. of low-pressure polyolefin to 50,000,000 lb. per year.

CITIES SERVICE CO. is building a 120,000,000-lb. per year ortho-xylene plant at Lake Charles, La. Raw material will come from nearby Cities Service refinery.

COLLIER CARBON & CHEMICAL CORP. is building facilities in Los Angeles to produce 250 tons per day of sulfuric acid from H_2S and spent alkylation acid, with completion late 1960.

COLUMBIA HYDROCARBON CORP., subsidiary of Columbia Gas System, Inc., will add ethylene-production facilities to its fractionation plant at Siloam, Ky.

COLUMBIA-SOUTHERN CHEMICAL CORP., subsidiary of Pittsburgh Plate Glass Co., is building a new plant at Lake Charles, La., to make ethylene dichloride, with completion in September 1960. Plant will cost more than $1,000,000.

COLUMBIAN CARBON (CANADA), LTD., is building a 40,000,000-lb. per year carbon-black plant in the Toronto area, with completion in 1961.

CONTINENTAL CARBON CO. (owned by Continental Oil Co., Witco Chemical Co., and Shamrock Oil & Gas Corp.), is building the West Coast's first high-abrasion carbon-black plant at Bakersfield, Calif. The $2.5 million plant will have capacity of 30,000,000 lb. per year.

CONTINENTAL OIL CO., Lake Charles, La., is adding facilities to produce 50,000 tons per year of straight-chain primary alcohols from ethylene, with completion in 1961.

At Ponca City, Okla., Continental is building facilities to produce 65,000 tons per year of cyclohexane from benzene. Completion expected in 1960.

COOPERATIVE FARM CHEMICALS ASSOCIATION, Lawrence, Kans., is increasing ammonia capacity from 280 to 380 tons per day and urea capacity from 30 tons of 100% urea to 50 tons daily.

COPOLYMER RUBBER & CHEMICAL CORP., Baton Rouge, La., will increase capacity of butadiene facilities to 55,000 short tons per year. The $5-million expansion is set for completion in mid-1961. Contractor is Foster Wheeler Corp., New York. Current expansion of copolymer facilities will increase gross rubber-production capacity from 95,000 to 127,000 long tons per year and net production capacity from 73,500 to 95,000 long tons per year, with completion early 1961.

COSDEN PETROLEUM CORP., Big Spring, Tex., will add facilities to produce 3,000,000 lb. per year of meta-xylene (95% purity), using mixed xylenes as raw material. Completion set January 1, 1961. Cosden also is boosting styrene capacity to 60,000,000 lb. per year and ortho-xylene capacity to 80,000,000 lb. per year, with completion late 1960.

CYANAMID OF CANADA, LTD., is replacing coal with natural gas for making ammonia and ammonium nitrate at Welland, Ont. Completion scheduled in 1960.

DIAMOND ALKALI CO., Deer Park Plant, Pasadena, Tex., will add 40,000,000 lb. per year acetylene capacity by January 1962. New facliities for vinyl chloride polymer will be completed February 1961.

At Bell, W. Va., new facilities for chlorinated methanes will be completed March 1961.

DOW CHEMICAL CO., Allyn's Point, Conn., is adding facilities to produce

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latex from styrene and butadiene, with completion first quarter 1961.

At Freeport, Tex., and Midland, Mich., combined styrene capacity will be expanded to 800,000,000 lb. per year.

The company is building a new phenol plant at Kalama, Wash., with capacity of 36,000,000 lb. per year. Raw material will be toluene. Completion expected third quarter 1961.

At Plaquemine, La., Dow will complete polyethylene facilities in October 1960. Vinylidene chloride and methyl chloroform units are scheduled for completion in 1961.

At Torrance, Calif., Dow will add polypropylene facilities in 1961.

At Williamsburg, Va., facilities to produce 12,000,000 lb. per year of nylon 6 will be completed late 1961.

DOW CHEMICAL OF CANADA, LTD., Sarnia, Ont., will complete facilities for production of vinyl chloride from chlorine and hydrocarbon in October 1960.

At Fort Saskatchewan, a new plant will produce pentachlorophenol from chlorine and phenol when completed late 1960. Also, facilities for glycols and amines from ethylene and ammonia will be completed late 1961.

A new plant at Vancouver, B. C., will produce 24,000,000 lb. per year of phenol when completed mid-1961. Raw materials will include benzene.

DU PONT DE NEMOURS & CO., E. I., Beaumont, Tex., will be able to produce 50,000,000 lb. per year of caprolactam based on cyclohexane when facilities are completed by end of 1960. New facilities will also include acrylonitrile for internal use.

At Belle, W. Va., DuPont will complete methylamine facilities early 1961.

At Florence, S. C., a new plant is under way to double Du Pont's capacity of polyester film, with completion 1961.

At La Porte, Tex., sulfuric-acid facilities will be completed in 1961.

At Victoria, Tex., by late 1961 new facilities will produce high-pressure polyethylene.

DX SUNRAY OIL CO. will complete a Udex unit at the Tulsa refinery in fall 1960. Capacity will be 600 bbl. of benzene and 300 bbl. of toluene daily. Refinery Engineering, Tulsa, is contractor.

EL PASO NATURAL GAS CO. and REX-ALL DRUG & CHEMICAL CO. will build new facilities at Odessa, Tex., to handle 150,000,000 lb. per year of ethylene made from ethane and propane, and 120,000,000 lb. per year of high-pressure polyethylene, with completion January 1962. New facilities will also include propylene, linear polyethylene, and polypropylene.

ESSO STANDARD, Division of Humble Oil & Refining Co., Baton Rouge, La., will increase butyl-rubber capacity 18,000 long tons by May 1961.

ETHYL CORP., Pasadena, Tex., will complete facilities to produce vinyl chloride monomer from ethylene early 1961.

ETHYL CORP. OF CANADA, LTD., is building a new plant at Corunna, Ont., to produce ethyl chloride and ethylene dichloride from ethylene, HCl, and chlorine. Completion November 1, 1960.

FIRESTONE TIRE & RUBBER CO., Akron, is increasing capacity of copolymer plant.

At Orange, Tex. butadiene capacity is being increased from 40,000 to 70,000 tons per year. Facilities for butadiene-based and isoprene-based rubber will be completed early in 1961.

FOSTER GRANT CO., INC., will build polyethylene facilities at a site not yet announced. Construction will start in 1960, with completion in 1961.

At Baton Rouge, La., styrene capacity will be expanded from 145,000,000 to 180,000,000 lb. per year, with completion in 1960.

GENERAL ANILIN & FILM CORP., as first step in a 5-year expansion program, will expand facilities at Calvert City, Ky., for production of such acetylene chemicals as pyrrolidone and vinylpyrrolidone as well as surfactants and intermediates.

GOODRICH-GULF CHEMICALS, INC., will build a new plant to make polyisoprene or polybutadiene either at Institute, W. Va., or in Orange County, Texas. Capacity will be 25,000 tons per year, with completion late 1961.

At Port Neches, Tex., completion of new facilities for 13,000,000 lb. per year of polyethylene is expected early 1961.

GOODYEAR TIRE & RUBBER CO. is building a synthetic rubber plant near Beaumont, based on isoprene and butadiene, with completion spring 1961.

W. R. GRACE & CO.'s Nitrogen Products Division is expanding ammonia capacity at Memphis, Tenn., from 100,000 to 160,000 tons per year, with completion first quarter 1961.

GULF OIL CORP., Philadelphia, is adding a unit to produce 35,000,000 to 40,000,000 lb. per year of oxo alcohols, with Badger Manufacturing Co., Cambridge, Mass., contractor. Additional facilities to produce oxo derivatives to follow.

HERCULES POWDER CO., Burlington, N. J. is expanding dimethylterephthalate capacity from 12,000,000 to 36,000,000 lb. per year, with completion by October 1960.

At Hercules, Calif., new facilities will include capacities for 50,000,000 lb. per year of formaldehyde, 8,000,000 gal. per year of methanol, and 11,000 tons per year of urea-formaldehyde compositions.

A new plant at Lake Charles, La., will have capacity of 100,000,000 lb. per year of polypropylene, with the first 50,000,000-lb. unit ready early 1961.

HEYDEN NEWPORT CHEMICAL CORP. is building a new plant at Fords, N. J., for production of 24,000,000 lb. per year of maleic anhydride. Scientific Design Co. New York, has contract.

HOOKER CHEMICAL CORP. will complete facilities for production of phenol from benzene at South Shore, Ky., by the end of 1961.

HOUSTON CHEMICAL CO., subsidiary of Chatham-Reading Chemical Corp., will build a new plant at Beaumont, with completion late 1961 or 1962. Products will include tetraethyl and tetramethyl, plus ethylene oxide and derivatives, based on ethylene from Mobil Oil Co.'s new plant at Beaumont.

HUBER CORP., Baytown, Tex., will increase carbon-black capacity from 110 to 193 tons per day by January 1, 1961, at cost of $2,500,000.

HUMBLE DIVISION, Humble Oil & Refining Co., Baytown, Tex., will increase butyl-rubber output from 125,000,000 to more than 170,000,000 lb. per year, with completion second quarter 1961.

KOPPERS CO., INC., Kobuta, Pa., is increasing capacity of polystyrene about 15% with completion by late 1960.

At Port Arthur, Tex., new facilities under way will boost capacity of high-pressure polyethylene by 35% to 46,000,000 lb. per year, with completion late 1960.

MOBIL CHEMICAL CO., Beaumont, Tex., is building new facilities to produce 380,000,000 lb. per year of ethylene, 100,000,000 lb. of propylene, and 20,000,000 lb. per year of butadiene, with completion by M. W. Kellogg Co., New York, scheduled first quarter 1961.

MONOCHEM, INC., (Borden Co. and U. S. Rubber Co.) is selecting a site somewhere between Corpus Christi, Tex., and New Orleans to build a plant to produce 80,000,000 lb. of acetylene and 150,000,000 lb. of vinyl chloride monomer yearly, with completion in 1962. Borden and U. S. Rubber each will then erect its own plants to use Monochem's output.

MONSANTO CANADA, LTD., was scheduled to complete a 6,000,000-lb. per year maleic anhydride plant at Ville La Salle (Montreal), Que. in fourth quarter 1960. Also under way is expansion of polyvinyl chloride capacity and plasticizers unit.

MONSANTO CHEMICAL CO., Kearny, N. J., was scheduled to complete facilities for alkyl phenols in September 1960.

At Monsanto, Ill., the company is modernizing phenol facilities with completion by mid-1961.

At St. Louis, Scientific Design Co., New York, has contract to build maleic anhydride facilities with capacity of 40,000,000 lb. per year.

Production of styrene monomer will be increased by at least 200,000,000 lb. per year at a site in Texas, with first stage expected to be in operation first quarter 1961.

NOVAMONT CORP. (subsidiary of Montecatini), Neal, W. Va., was scheduled to complete its 25,000,000-lb. per year plant for polypropylene and other polyolefins in 1961.

ODESSA STYRENE CO. (subsidiary of El Paso Natural Gas Products Co.), Odessa, Tex., is expanding styrene capacity from 60,000,000 to 85,000,000 lb. per year in 1960.

PANTESOTE CO., Passaic, N. J., is reportedly planning to triple capacity of polyvinyl chloride facilities to 45,000,000 lb. per year.

PENNSALT CHEMICALS CORP., Houston, will complete facilities to produce alkyl mercaptans from petroleum naphthas early 1961.

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PLANT CONSTRUCTION (Continued)

PETRO-TEX CHEMICAL CORP., Houston, will complete by late 1960 a full-scale pilot plant for polybutene-1. Set for completion mid-1961 are facilities for production of 30,000,000 lb. per year of maleic anhydride.

PHILLIPS CHEMICAL CO., Orange, Tex., will complete a new carbon-black plant fourth quarter of 1960. Capacity will be 60,000,000 lb. per year.

At Sweeny, Tex., new ethylene facilities to nearly double existing capacity will be completed third quarter 1961.

POLYMER CORP., LTD., is planning a cis-polybutadiene plant at Sarnia, Ont., which would have capacity of 20,000 tons per year. Raw material would be light gases from refineries.

REICHHOLD CHEMICALS, INC., Elizabeth, N. J., will complete a 20,000,000-lb. per year maleic anhydride plant late 1960. Raw material for the $5,000,000 plant will be benzene.

At Tuscaloosa, Ala., Reichhold will double formaldehyde capacity. Also a $1,500,000 program is under way to expand production of pentaerythritol from formaldehyde and acetaldehyde.

REICHHOLD CHEMICALS (CANADA) plans to build a phenol and formaldehyde unit at Port Moody, B. C.

At St. Therese, Que., the company plans a 7,000,000-lb. per year phthalic anhydride unit.

SHELL CHEMICAL CO., Torrance, Calif., is building a commercial polyisoprene plant, with completion fall 1960. Capacity will be 17,850 long tons per year.

Another polyisoprene plant, with capacity of more than 35,000 long tons per year, will be built by Shell somewhere in the Midwest. Completion set for third quarter 1961.

At Norco, La., new facilities for acrolein and glycerin will go on stream third quarter 1960.

SINCLAIR-KOPPERS CHEMICAL CO. is building a new 70,000,000-lb. per year styrene monomer plant in Houston. Completion set for third quarter 1961.

SINCLAIR PETROCHEMICALS, INC., will build a new unit to produce ortho-xylene at Houston, with capacity of 70,000,000 lb. per year. Initial production scheduled second quarter 1961.

SOGENINES, LTD. (affiliated with Ste. Generale de Belgique, Brussels), was reportedly planning a new synthetic-rubber plant in Maitland, Ont.

SOLAR NITROGEN CHEMICALS, INC. (Standard Oil Co. of Ohio and Atlas Powder Co.) will build a 300-ton per stream day plant at Joplin, Mo., with completion spring 1961. Products to include ammonia, urea, and others.

The company is expanding ammonia, urea, nitric acid, and nitrate capacity at Lima, Ohio. Ammonia capacity will be increased by 25,000 tons yer year.

SOUTHERN NITROGEN CO., INC., Savannah, Ga., will hike urea capacity from 10,000 to 16,000 tons per year, with completion January 1, 1961. Nitric acid facilities will be increased from 100,000 to 130,000 tons per year October 1, 1961.

STANDARD OIL CO. OF CALIFORNIA is adding new facilities at Richmond, Calif., for production of 20,000,000 lb. per year of maleic anhydride. Also, capacity for polybutene will be doubled, with completion in 1961.

STAUFFER CHEMICAL CO., Delaware City, Del., will make carbon disulfide from natural gas at a new plant to go on stream November 1960.

Stauffer, Shell Chemical Co., and Western States Chemical have formed a new company to build a plant near Stauffer's Dominguez, Calif., plant, for production of 225,000,000 lb. per year. Other products will include 55,000,000 lb. per year of ethylene oxide.

ST. PAUL AMMONIA PRODUCTS, INC., will expand capacity of its Pine Bend plant at South St. Paul, Minn., from 88,000 to 110,000 tons per year of anhydrous ammonia and nitrogen solutions at a cost of more than $4 million. Construction to start fall 1960 with completion spring 1961.

SUNOLIN CHEMICAL CO., North Claymount, Del., plans to complete a new ethylene plant by fall 1961, with capacity of 225,000,000 lb. per year. Other products will include 55,000,000 lb. per year of ethylene oxide.

SUN OIL CO. has announced plans to build a 100,000,000-lb. per year high-purity napthalene plant at Toledo, using intermediate petroleum stocks.

SUNTIDE REFINING CO., Corpus Christi, Tex., plans to build a $1-million hydrodealkylation unit to produce benzene, with construction to start in August and completion early 1961. The new unit will nearly triple Suntide's benzene production of about 450 bbl. per day.

TENNESSEE EASTMAN CO. (Eastman Chemical Products, Inc.) is building a high-purity hydrogen plant at Kingsport, Tenn., with capacity of 900,000 cu. ft. per day. Completion scheduled in 1960. Raw material will be natural gas.

TENNESSEE OIL REFINING CO., Division of Tennessee Gas Transmission Co. will build facilities at Chalmette, La., to produce 2,000 bbl. per day of benzene, toluene, and xylenes. Raw material will be crude oil.

TEXAS EASTMAN CO. (Eastman Chemical Products, Inc.) will complete new facilities at Longview, Tex., to produce polypropylene in 1961. Capacity will be 20,000,000 lb. per year.

TEXAS-U. S. CHEMICAL CO. (owned by Texaco Inc. and U. S. Rubber Co.) is increasing synthetic-rubber copolymer production at Port Neches, Tex., by about 10% to 156,000 long tons per year, with completion early 1961.

TIDEWATER OIL CO. and COLLIER CARBON & CHEMICAL CO. plan to build a 50,000,000-lb. per year naphthalene plant at Tidewater's Delaware City, Del., refinery.

UNION CARBIDE CANADA, LTD., Montreal East, Que., is increasing polyethylene capacity, with completion fourth quarter 1960. Combined capacity for ethylene oxide, polyglycols, glycol ethers, and ethanolamines is being doubled with completion first quarter 1961.

UNION CARBIDE CARIBE, INC., will build a 110,000,000-lb. per year polyethylene plant near Ponce, Puerto Rico, with completion second half 1962. Estimated cost, $20,000,000.

UNION CARBIDE CHEMICALS CO. is building a 72,000,000-lb. per year polyethylene plant at Whiting, Ind.

At Seadrift and Texas City, Tex., Union Carbide will expand capacity of low-density polyethylene by 170,000,000 lb. per year, according to an earlier announcement by the company. Completion scheduled in 1961.

The company is converting the former Amoco plant at Brownsville, Tex., to petrochemicals. Products will include acetic acid, acetic anhydride, and methyl ethyl ketone, with completion early 1961.

UNION CARBIDE PLASTICS CO., Marietta, Ohio, is boosting capacity of phenol facilities from present 85,000,000 to 110,000,000 lb. per year, with completion in 1960.

WITCO CHEMICAL CO. reportedly plans to build a 30,000,000-lb. per year phthalic anhydride plant on the East Coast, with completion scheduled last quarter 1961.

WITFIELD CHEMICAL CORP. (Richfield Oil Corp. and Witco Chemical) will build a new plant adjacent to Richfield's Watson, Calif., refinery in Los Angeles, to produce dodecylbenzene.

WYANDOTTE CHEMICALS CORP., Michigan Alkali Division, will produce block polymer surfactants, polypropylene glycols, and urethane grade polyols made from propylene and ethylene oxides when new facilities are completed at Wyandotte, Mich. late 1960.

Field-processing-plant construction

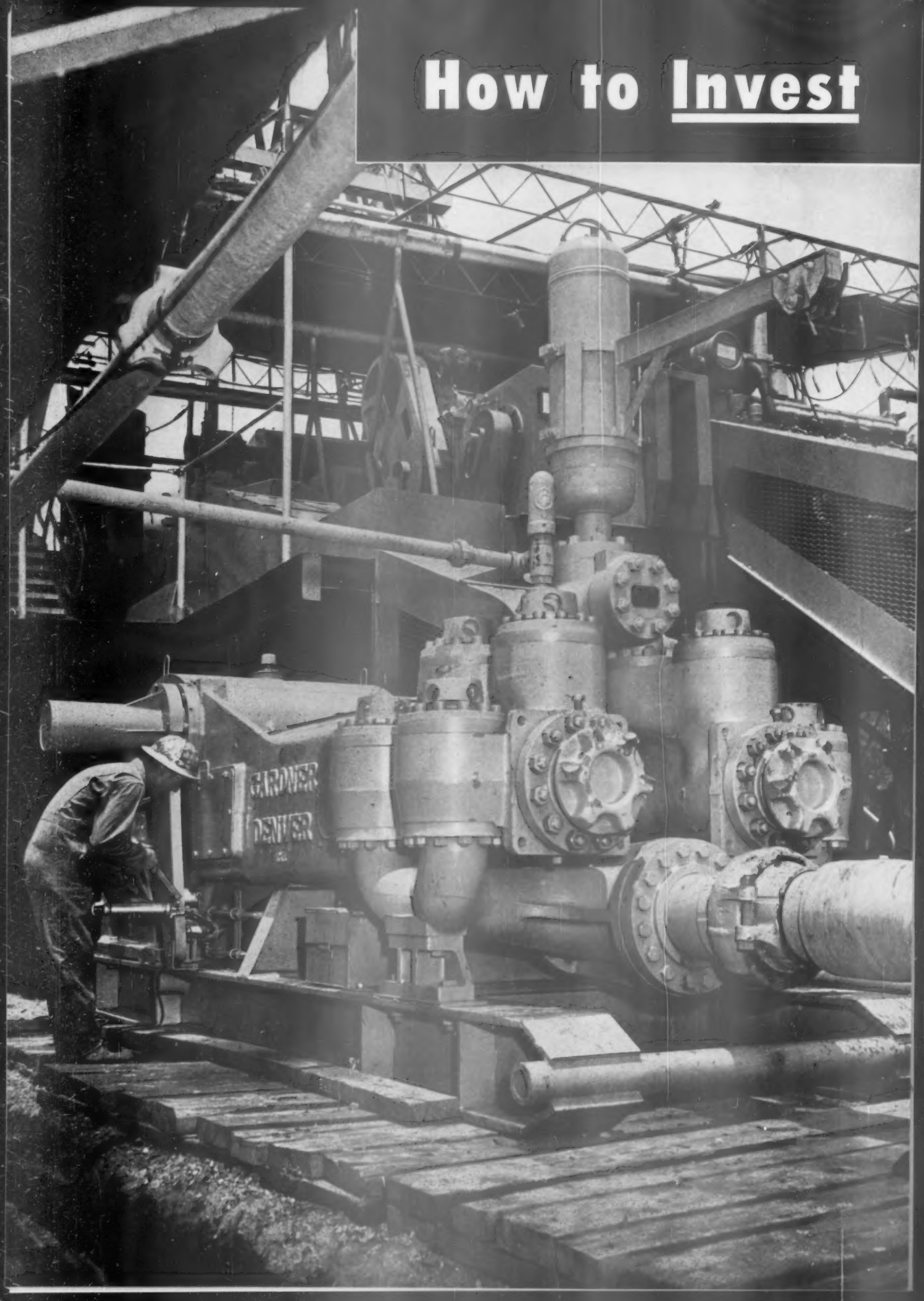
ACADIA CORP. is building new fractionation and reformation facilities at its existing plant in Acadia Parish, Louisiana, with completion scheduled September 1, 1960. Liquid production will be 420,000 gal. daily. Hudson Engineering Corp. has contract.

ANTELOPE GAS PRODUCTS CO. is building a new absorption plant near Kimball in Banner County, Nebraska. Capacity will be 9.6 M.M.c.f. daily and production 70,000 gal. daily. Contractor is O. L. Olsen Co., Inc., Houston, and completion is set for August 1, 1960.

BRITISH AMERICAN OIL CO., LTD., is building Canada's largest field-processing plant at Homeglen-Rimbey and Westerose South fields near the town of Rimbey, about 110 miles north of Calgary. Capacity will be 326 M.M.c.f. daily when completed November 1, 1960, by Poole-Pritchard Canadian, Ltd., Calgary, Alta. Products will include 68,000 gal. daily of C_3, 98,000 gal. per day of C_4, and 325,000 gal. per day of C_5+.

CABOT CARBON CO. is remodeling its Estes plant in Ward County, Texas, with completion scheduled December 15, 1960. Capacity will be 25 M.M.c.f. daily with liquid recovery of 37,500 gal. daily.

How to Invest



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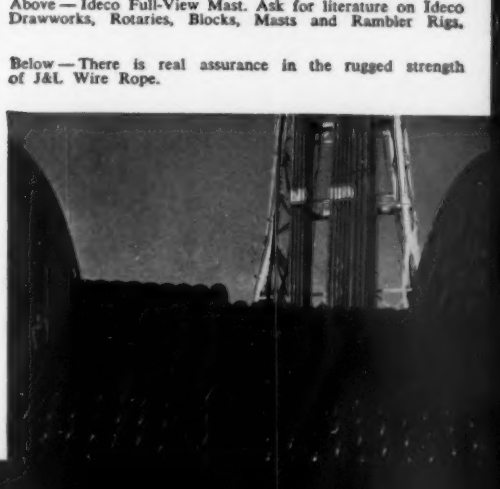

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PLANT CONSTRUCTION (Continued)

The company's Walton plant in Eastland County, Texas, is also being remodeled, with completion September 30, 1960. Capacity will be 38 M.M.c.f. daily with liquid recovery of 57,000 gal. daily.

CALIFORNIA STANDARD CO. will complete a plant in the Homeglen-Rimbey field, Alta., in late 1960. Capacity will be 120,000 M.c.f. daily. Daily recovery will include 5,460 gal. of propane, 42,000 gal. of butane, 71,400 gal. of natural gasoline, and 300 long tons of sulfur.

COLUMBIA HYDROCARBON CORP., a subsidiary of Columbia Gas System, has an extraction plant under construction at Neal, W. Va. Products are slated for its Siloam, Ky., fractionating plant.

CONTINENTAL OIL CO. is adding absorption-refrigeration facilities at its Louisiana Gas System plant in Calcasieu Parish, near Lake Charles, La. Capacity will be 150 M.M.c.f. daily, with average daily production ranging from 93,000 to 158,000 gal. Completion is set for January 1, 1961. The plant will have 50% ethane recovery, and recovery of 100% of propanes plus.

EL PASO NATURAL GAS CO. is building a new plant in Brown-Bassett field, Terrell County, Texas, using the Fluor Corp., Ltd., solvent CO_2 removal process. The new treating facility will produce 100 M.M.c.f. of residue gas daily. Completion by Fluor is expected in December 1960. This will be the first gas-treating facility to use the process, which applies an organic solvent to physically absorb high concentrations of CO_2 from natural gas. Natural gas from Brown-Bassett field contains up to 53% CO_2.

GOLIAD CORP. is building a $12-million absorption-refrigeration plant in Vermilion Parish, about 9 miles south of Kaplan, La. The plant, with capacity of 450 M.M.c.f. of natural gas daily, will extract 295,000 gal. of liquids per day. Fluor Corp., Ltd., Los Angeles, and Brown & Root, Inc., Houston, have contracts. Completion is expected in October 1960.

HARMATTAN area of Alberta will be the site of two new field-processing plants. According to plans revealed before the Alberta Oil & Gas Conservation Board, the plant at Harmattan Ekton field would have capacity of 110 M.M. c.f. daily and another at Harmattan East field, 100 M.M.c.f. per day.

HUMBLE OIL & REFINING CO. will complete its 800-M.M.c.f. daily King Ranch plant in Kreberg County, Texas, late in 1960. The absorption-type plant is 15 miles south of Kingsville and is the largest of its kind in America. Liquids extraction will average about 1,176,000 gal. daily. Hudson Engineering Corp., Houston, has the contract. Cycling facilities will be included.

HUNT OIL CO. is building a plant with 25 M.M.c.f. capacity at Franks field, near Alta Loma in Galveston County, Texas. It will extract 33,000 gal. of deethanized product daily. Process method is refrigeration-absorption. Hudson Engineering Corp., Houston, has the contract, and completion is expected August 1, 1960.

JEFFERSON LAKE PETROCHEMICALS OF CANADA, LTD., is planning a new $20-million plant at Coleman, Alta., to serve the Savanna Creek field. Scheduled for completion in 1961, the plant will have an output of 130 M.M.c.f. daily of residue gas and 550 long tons per day of sulfur.

The company's new plant in the East Calgary field, Alta., will have an output of 30 M.M.c.f. of residue gas daily; 12,600 gal. per day of propane, 16,800 gal. of butane, 84,000 gal. of natural gasoline, and 350 tons per day of sulfur. It is scheduled for possible completion late in 1960.

MOBIL OIL OF CANADA heads a group of operators which may construct a 30 M.M.c.f. gas-processing plant in the Wimborne area of Alberta. Necessary gathering, processing, and sulfur-recovery facilities would cost about $3,750,000, and daily production would consist of 4,200 gal. of stabilized gasoline and 140 long tons of sulfur.

NGL CORP. will complete a new processing plant on the Sabine River, south of Orange, Texas, probably in April 1961. The plant will process natural-gas condensate, distillate, and natural gasoline, and will turn out 98-octane gasoline initially. Described as a 20,000-bbl. per day plant, it will have cat reforming and catalytic hydrogen treating.

NORTHERN NATURAL GAS CO. is doubling capacity of its Spearman plant in Ochiltree County, Texas, to 200 M.M.c.f. daily. The additional capacity, using the refrigeration method, will result in 16,000 gal. daily of products. Dresser Engineering Co. has the contract, and completion is expected in October 1960.

PAN AMERICAN PETROLEUM CORP. is expanding its Old Ocean field plant in Brazoria County, Texas, from present 350 M.M.c.f. daily to 570 M.M.c.f. daily. The plant will use refrigeration and absorption and will extract 650,000 gal. of products daily, compared with present production of about 287,000 gal. daily. Brown & Root, Inc., Houston, has contract, with completion set for summer 1960.

Pan Am has tentative plans to begin construction of a new plant 25 miles west of Whitecourt in the Windfall field to serve Windfall, Pine Creek and Beaver Creek fields, Alberta. Initially all the intake will be from Windfall. This will involve 177 M.M.c.f. of natural gas per day, resulting in 110 M.M.c.f. per day residue gas, 567,000 gal. of 13-lb. stabilized condensate per day, 147,000 gal. of LPG, and 620 long tons of sulfur per day.

The company's 18-M.M.c.f. per day plant at Empire-Abo field, Eddy County, New Mexico, will go on stream August 1, 1960. Recovery will be 64,000 gal. of products daily.

PHILLIPS PETROLEUM CO. is building a plant southeast of Artesia, N. M., for processing gas from Atoka, Dayton, Abo, Empire-Abo, East Millman, Artesia, Red Lake, and other fields for pipeline delivery to Phillips' processing centers near Borger and Sweeny, Tex. Initial capacity will be 35 M.M.c.f. daily. Liquid recovery will be about 100,000 gal. daily.

Phillips is expanding its existing 300-M.M.c.f. per day plant at Taylor, B. C., to include a new crude unit, cat cracker, and HF alkylation unit. Contractor is Stearns-Roger Manufacturing Co., Denver, and completion is set for August 1960.

RUNNELS GAS PRODUCTS CORP. is expanding its Eunice plant in Louisiana from the existing 450 M.M.c.f. to 800 M.M.c.f. per day. The plant will extract 850,000 gal. of products daily after completion January 12, 1961. Fluor Corp., Ltd., Los Angeles, has contract for the low-temperature, low-molecular-weight-absorption-oil-type plant.

SHELL OIL CO. is planning to build the industry's first natural-gasoline plant at the mouth of the Mississippi River in the Southwest Pass area of Louisiana's Gulf of Mexico. The new low-refrigeration and absorption facility will have initial capacity of 75,000 to 80,000 M.c.f. daily and an ultimate capacity of about double that. Recovery is estimated at 30,450 gal. per day of natural gasoline and 16,800 gal. of propane.

SOUTHWEST GAS PRODUCING CO., INC., is building a plant in Calhoun field, Ouachita Parish, Louisiana, with capacity of 75 M.M.c.f. daily and liquid recovery of 140,000 gal. daily. Completion by Fish Engineering Corp., Houston, is scheduled September 1, 1960. Process method at the $1,500,000 project will be refrigeration-absorption.

STANDARD OIL CO. OF CALIFORNIA will build a plant in the Red Wash field, Uintah County, Utah, to extract about 21,000 gal. of liquid daily. Residue gas will move into El Paso Natural Gas Co.'s system at the Red Wash compressor station.

SUNRAY MID-CONTINENT OIL CO. will increase capacity of its Carancahua Bay plant in Jackson County, Texas, from 30 M.M.c.f. daily to 60 M.M.c.f., with completion expected August 1, 1960. Liquids will be increased by 30,000 gal. per day.

TENNESSEE OIL REFINING CO., has contracted with O. L. Olsen Co. to build a natural-gas processing plant near Palacios, Tex. Plant will have a capacity of 55 M.M.c.f. of gas daily. Production will be about 58,000 gal. of liquids daily.

TEXACO INC. is building a plant in South Kermit field, Winkler County, Texas, with capacity of 7 M.M.c.f. daily and liquid recovery of 12,000 gal. daily. Completion is set for fall 1960.

TEXAS GULF PRODUCING CO. is adding condensate fractionation at its Headlee plant in Ector County, Texas. Capacity will be 40 M.M.c.f. daily and liquid recovery of 80,000 gal. daily. The process method will be absorption, and completion is scheduled January 1, 1961.

TIDEWATER OIL CO., at New Hope field in Franklin County, Texas, will complete a new plant in August 1960. Capacity will be 50 M.M.c.f. daily. Liquid recovery will be 386,000 gal. daily. Process method will be absorption. Brown & Root, Inc., Houston, is contractor.

WARREN PETROLEUM CORP. has a $1,900,000 modernization program under way at three plants, with completion expected third quarter 1960. Electrical and steam generating units are being installed at the Monument, N. M., plant, which will increase propane production 20,000 gal. daily. Capacity of the McLean, Tex., plant is being increased 15,000 gal. daily, and new facilities at the Fostoria plant in Montgomery County, Texas, will increase deethanized gasoline production 45,000 gal. daily.

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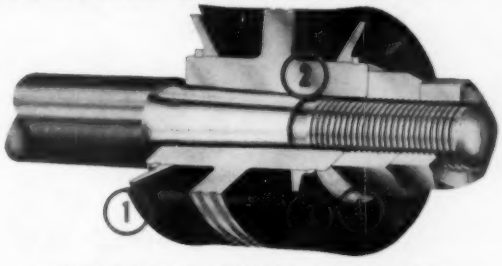

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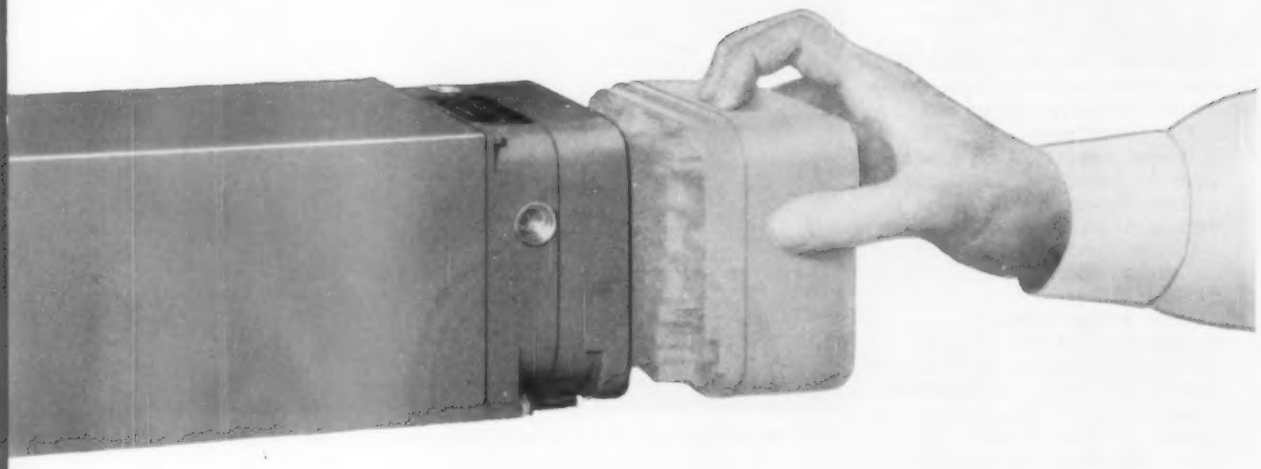

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The
FOREMAN'S PAGE

Efficiency:

putting energy to work at the refinery

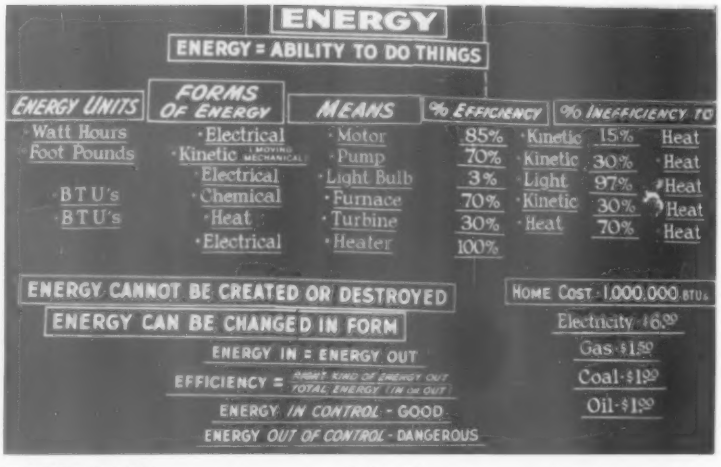
WHEN WE SPEAK of the efficiency of a motor, furnace, light bulb, etc., (or any other kind of energy-conversion equipment), we usually mean the per cent of energy which went into the equipment that came out as the kind of energy we wanted.

Furnace efficiency, for example, is the per cent of B.t.u.'s produced from the burning of fuel that went to heat the process stream in the furnace tubes. If 70 out of every 100 B.t.u. fired go to heat the process stream, the furnace is said to be 70% efficient.

Since energy cannot be created or destroyed, and since not all of the energy is used as we want, the rest of the energy must go some place. Table 2 lists typical efficiencies for common pieces of equipment and where the remainder of the energy goes.

Notice that the energy that is not used as desired is usually transformed into heat energy. In fact, practically all energy in a refinery eventually ends up as heat energy which "leaks" away to the air and other surroundings.

Energy, when it is under control, is useful; however, energy, even in small amounts, can be dangerous when it is out of control or when it is used improperly.



FLANNEL BOARD summarizes some of the things to remember about energy.

A tank full of gasoline in your car can do more damage than 100 lb. of dynamite, since gasoline, pound for pound, has more stored chemical energy than dynamite.

Compressed air can expel a rock or piece of metal out the end of a hose or piece of pipe at a velocity near that of a bullet. A vessel which ruptures at a low pressure is not as dangerous as one rupturing at high pressure, due to the stronger vessel's higher energy content at the time of rupture.

Equipment moving at high speed has a large amount of kinetic (moving) mechanical energy. Turbines have been known to fly apart when overspeeded and to send bits of casing, wheel, and turbine blading spraying around the area like shrapnel from a bomb.

If liquid gets into the feed gas of a reciprocating compressor, the compressor cylinder head may be blown off the compressor due to the kinetic energy imparted by the moving piston through the noncompressible liquid to the cylinder head.

Summary

Energy is the "capacity for doing work" or the "ability to do things."

Energy can take many forms. It can be heat, electrical, mechanical, kinetic (moving), or potential (height) energy.

Energy cannot be created or destroyed.

Energy can be changed from one form to another.

Whenever energy is put into something (pump, furnace, compressor, etc.), it must either come out or be stored.

Efficiency is the per cent of energy going into equipment that comes out as the kind of energy wanted.

Controlled properly, energy is useful.

Out of control, energy is dangerous.

This material taken from process-training-program manual, Bayway, N. J., refinery of Esso Standard Oil Co.

TABLE 2—TYPICAL EFFICIENCIES

	Per cent efficiency	Per cent inefficiency	And where it goes
Motor (normal load)	85	15	Heat to windings and air
Air compressor	70	30	Heat to jacket-cooling water
Pump	70	30	Heat to fluid and surroundings
Steam turbine (condensing)	30	70	Heat to cooling water
Pipe-still furnace	73	27	Heat in flue gas
Cracking-coil furnace	50	50	Heat in flue gas
Heat exchanger	95	5	Heat to surroundings
Gasoline engine	20	80	Heat to exhaust gas and cooling water
Diesel engine	30	70	Heat to exhaust gas and cooling water
Gas turbine	15	85	Heat to flue gas
Electric heater	100	0	
Air hammer motor	60	40	Heat to hammer and air
Home gas hot-water heater	50	50	Heat to flue gas
Incandescent light bulb	3	97	Heat to bulb and air
Fluorescent light bulb	15	85	Heat to bulb and air

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BY W. L. NELSON
Technical Editor and
Petroleum Consultant

100 years of processing advances

. . . obsolescence, additions, improvements

IN THE chronological tabulation on this page, the different phases of refinery operation are designed as:

D—Distillation, cracking and general.
T—Treating of light oils.
G—Gas recovery and processing.
L—Lubricating-oil manufacture.
C—Chemical manufacture.

A dagger (†) indicates a process change that is significant because a capital expenditure is required, and a double dagger (‡) indicates that the change caused existing equipment to become obsolete.

More detail about the various process changes may be obtained from the following Questions on Technology in The Oil and Gas Journal:

1. Changes in Crude Processing, May 20, 1957, p. 201.
2. Obsolescence in Cracking Equipment, September 9, 1957, p. 123.
3. History of Light-Oil Treating Processes, July 1, 1957, p. 151.
4. Changes in Gas Processing, June 3, 1957, p. 119.
5. How We Have Improved Octane Number, November 11, 1957, p. 194.
6. Obsolescence in Lubricating-Oil Manufacture, September 30, 1957, p. 115.

SCHEDULE OF TOPICS
On Obsolescence, Improvements, and Additions

No. 76—Processing Changes in the Refining Industry
No. 86—Obsolescence in Refinery Processing
No. 88—Frequency of Processing Changes
No. 90—Cost of Improvements in Quality and in Refinery Efficiency
No. 92—Cost of Obsolescence
No. 96—Capital Expenditures of the Refining Industry

The dates indicate acceptance by the industry and only by coincidence do they represent the dates at which large capital expenditures occurred. Nor are the dates to be confused with the time of invention or development, or the date of patents.

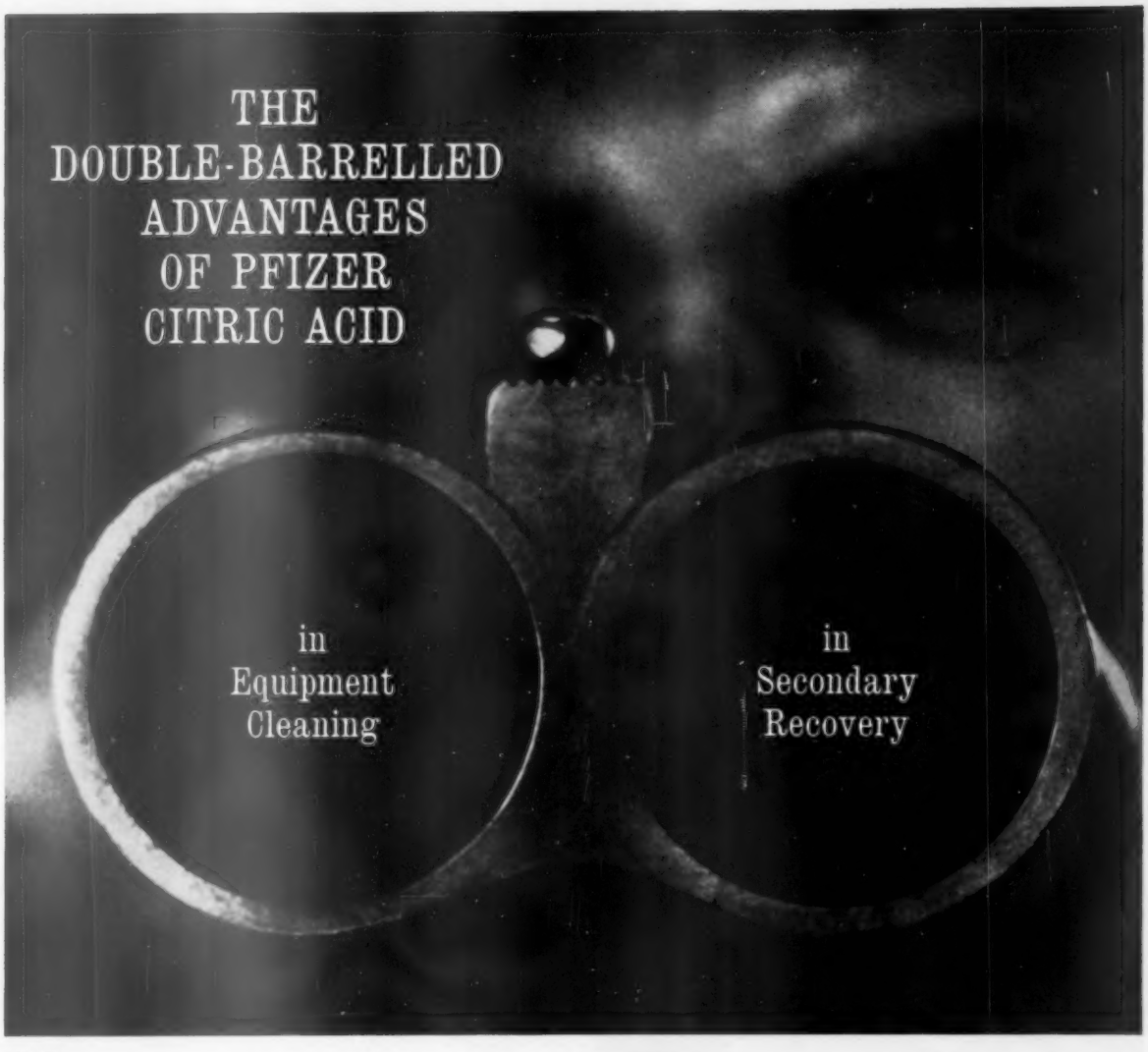
Changes in processing have taken place at the rate of more than one per year:

		Yr. per event
116	Changes or events	0.84
82	Involve improvement costs	1.2
63	Improvement but no obsolescence	1.6
19	Involve obsolescence	2.5
12	Severe obsolescence	12.5
44	Little cost	...

Chronological summary of changes in processing

	1855		Prof. B. Silliman, Jr., notes decomposition.
	1861		Cracking inadvertently discovered in plant.
D	†1865	(1860-1906)	Batch cheesebox or horizontal shell stills.
T	†1870	(1855-)	Sulfuric acid and caustic treatment of light oils.
D	1870	(1865-1910)	Dry or cracking distillation for kerosine.
	1871		Patents on wax sweating.
L	1880	(1860-)	Sulfuric acid and caustic treatment of lube oils.
L	†1880	(1860-1915)	Shell-still reduction of lube oils.
	1890		Lubricating oils produced in quantity.
D	†1890	(1885-1910)	Continuous shell-still battery.
T	†1890	(1880-)	Rerunning after acid treatment (light oils).
L	1891	(1890-1905)	Natural cold settling for dewaxing.
L	†1891	(1871-1955)	Pressing and sweating of paraffin distillate.
T	†1896	(1886-1925)	Frasch copper oxide desulfurization.
L	†1900	(1895-1925)	Cold settling with naphtha diluent.
	1903		Casing-head gasoline collected from cold coils.
L	†1905	(1900-1935)	Steam-still reduction for lube stocks.
D	1905	(1900-1910)	Packed towers on shell stills.
D	†1910	(1907-1912)	Shell-still coking (dry).
D	†1910	(1900-1930)	Settling still for bottom sediment.
D	1910	(1905-1935)	Cracking distillation for paraffin distillate.
L	†1912	(1910-)	Wax molding press, chipping machines, etc.
D	1912	(1900-1930)	Peak use of steam in shell stills.
G	1913		Stone-packed towers on gasoline-plant strippers.
L	‡†1915	(1910-)	Bauxite and clay percolation.
T	†1915	(1910-)	Sodium plumbate treating of light oils.
D	†1915	(1910-1927)	Burton pressure cracking stills.
D	†1915	(1910-1930)	Dephlegmators on shell-still batteries.
D	†1915	(1911-1930)	Perforated plate towers and pipe stills (California).
	1915		Ammonia refrigeration tried in gasoline plant.
G	†1916	(1909-1921)	Compression natural-gasoline process.
D	†1920	(1915-1930)	Perforated plate towers.
D	†1920	(1917-1930)	Jenkins and other cracking processes.
G	†1920	(1918-1923)	Adsorption process for natural gasoline.
D	1922		Extensive use of steam in coke stills.
L	†1922	(1920-)	Rotary clay burners.
L	‡†1922	(1920-1955)	Centrifuge dewaxing of cylinder stock.
L	†1922	(1912-)	Clay decolorization of light oils.
T	†1922	(1916-)	Continuous doctor sweetening.
C	1923	(1919-)	Isopropyl alcohol plant.
G	†1923	(1912-1931)	Absorption process for natural gasoline.
D	‡†1925	(1922-1935)	Reaction chamber cracking processes (tube and tank, Cross, Dubbs, Holmes-Manley, etc.).
T	†1926	(1923-)	Use of tetraethyl lead.
	1926	(1916-)	Sale of high-gravity (test) gasoline.
D	‡†1925	(1910-)	Power plant—two pressure stages.
D	1927	(1923-1933)	Coke production in cracking processes.
L	†1928	(1923-)	Clay contact filtration for lube oils.
D	1928	(1927-1945)	Gyro vapor phase cracking for gases.
G	†1928	(1926-)	Desulfurization of gases.
T	†1928	(1918-1936)	Sodium hypochlorite sweetening.
T	†1928	(1924-*)	Sulfur dioxide treating of light oils.
L	‡†1930	(1925-)	Vacuum towers with pipe stills (lubes).
T	†1930	(1925-1938)	Gray vapor phase treating to remove gum.

(Continued)



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Chronological summary of changes in processing (continued)

L	†1930	(1925-)	Multiple hearth clay burners.
G	†1930	(1927-)	Stabilizers on gasoline plants, etc.
D	†1930	(1925-1956)	Thermal reforming of naphthas.
D	††1930	(1925-)	Pipe stills and bubble plant towers (dominant).
D	†1930	(1927-1932)	Gyro V.P. cracking for gasoline.
T	1931		Dyes used in gasoline.
D	†1931	(1928-)	Continuous rerunning (light oil and lube).
D	†1932	(1928-1932)	Destructive hydrogenation (cracking).
G	†1932	(1928-1940)	Thermal polymerization and gas cracking.
T	††1932	(1928-)	Inhibitors for gum in gasoline.
L	1932	(1910-)	Edeleanu extraction for lube oils.
D	††1932	(1928-)	Delayed coking.
L	††1933	(1928-)	Solvent extraction processes for lube oils.
T	†1933	(1916-)	Continuous light oil treating (dominant).
L	1933	(1930-)	Pour point depressants.
D	††1935	(1930-)	Recovering propane in stabilizers.
G	††1935	(1933-)	Polymerization, catalytic.
D	†1935	(1930-)	High pressure steam.
L	††1935	(1927-)	Solvent dewaxing.
L	†1935	(1932-)	Propane deasphalting for lube oils.
T	†1935	(1928-)	Copper chloride sweetening.
D	††1935	(1928-)	Tube-still cracking dominant.
D	†1935	(1930-)	Asphalt by pipe still distillation.
D	†1936	(1929-)	Oven-type (specialty) coking processes.
D	†1937	(1932-)	Desalting, chemical or electrical.
C	1938	(1934-)	Gyro hydrocarbon cracking for ethylene.
L	1939	(1935-)	Thermofor kiln for clay burning.
D	†1939	(1930-)	Combination topping and cracking, etc.
D	†1939	(1936-1950)	Houdry fixed-bed catalytic cracking.
D	†1939	(1930-)	Viscosity breaking.
T	†1940	(1935-1950)	Clay or bauxite desulfurization.
G	1940		Liquefaction of natural gas for storage.
D	1940	(1938-)	Hydrocarbon separation (extensive).
T	†1941	(1939-)	Caustic extraction (solutizer) light oil sweetening.
D	†1941		Additional thermal cracking capacity.
G	†1943	(1941-1946)	Alkylation for aviation gasoline.
D	†1943	(1942-)	Isopentane separation for aviation fuels.
L	1944	(1938-)	Additives for lubricating oils.
C	1944	(1941-)	Hydroforming for toluene.
C	†1944	(1942-1945)	Butadiene for emergency.
D	††1945	(1937-)	Catalytic cracking processes.
L	††1945	(1940-)	Solvent deoiling.
D	†1949	(1937-)	Power—three-stage steam pressure.
D	†1949	(1938-)	Vacuum flashing for catalytic feed stock.
C	1950	(1940-)	Sulfur recovery from hydrogen sulfide.
D	†1950	(1946-)	Additional viscosity breaking.
G	1950	(1946-)	Hypersorption continuous adsorption.
D	†1950	(1944-)	Propane decarbonizing for cracking stocks.
C	†1951	(1938-)	Ethylene.
D	††1952	(1949-)	Reforming, catalytic (platinum catalyst).
D	†1952	(1950-)	Airlift TCC and Houdriflow catalytic cracking.
C	†1952	(1948-)	Additional butadiene.
L	1953	(1951-)	Thermofor continuous clay percolation and burning.
D	†1953	(1952-)	Continuous coking.
C	†1953	(1952-)	Benzene and aromatics.
T	†1954	(1953-)	Hydrodesulfurization, catalytic.
D	1954	(1948-)	Catalytic cracking of residues.
G	††1955	(1953-)	Alkylation for motor gasoline.
L	††1955	(1950-)	Wax molding, continuous.
G	1955	(1943-)	Isomerization of butane.
T	††1956	(1954-)	Inhibitor sweetening.
G	1956		Shipment of liquefied natural gas.
D	1957	(1942-)	Isomerization of pentane and naphthas.
L	1957	(1955-)	Urea room temperature dewaxing.

*Practiced since about 1912 outside the United States. † Significant changes with regard to cost of additions or obsolescence. ‡Clearly create obsolescence.

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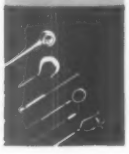

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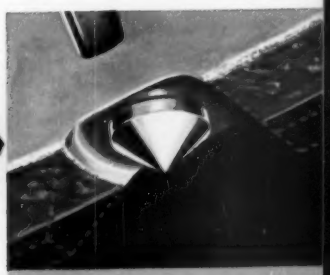

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Dry-hole costs trimmed in Williston basin

FIG. 1

• Hardly more than a year ago, dry-hole cost for a North Tioga field well was $73,000; today it costs $47,000. Drilling time has been cut 8 1/2 days, or 43%. Reasons: good jet-bit hydraulics and a low-solids, low-viscosity mud.

BY K. P. SWENSON AND H. G. SCHMIT
Carter Division,
Humble Oil & Refining Co.
Billings, Mont.

GOOD HYDRAULICS and low-solids mud have been available for use for several years; they simply had not been put into practice in Williston basin. As a result of their success at North Tioga, they have been put to use in other areas. Results were good in these areas too.

Described here are five wells drilled by Humble; two of these drilled prior to 1959 will be used to compare with those drilled with the improved methods. Though there are only five wells used in this comparison, they are representative of the wells drilled in the field by other operators.

The field, North Tioga, is in the northwest corner of North Dakota, 13 miles north of Tioga and 33 miles south of the Canadian border in Burke County. Production comes from Midale and Iverson formations (Mississippian) at 8,000 ft.

Improving drilling practice. In development wells, about 600 ft. of surface casing is usually set and a 7⅞-in. hole drilled to total depth. The long string may be 4½-in. or 5½ in. o.d. In the past, low-water-loss, salt-saturated, oil-emulsion mud has been used in such wells.

Is has been common to drill the upper bentonitic shales below surface casing with either fresh water or produced brine. At about 5,400 ft., this is converted to an oil-emulsion mud. There are massive Charles (Mississippian) evaporite beds at 7,100 ft. These are drilled with a salt-saturated system to minimize hole enlargement which would occur from dissolving salt out of the formations.

We based the optimum jet-bit hydraulics for Tioga on the concept of an optimum circulating rate. That is, for each rig and hole-size combination, there is a circulating rate that cleans the hole bottom best. The most bottom-hole cleaning in turn gives the fastest penetration rate, provided other factors are the same.

This optimum circulating rate considers limitations of the rig such as maximum horsepower and maximum working pressures.

Laboratory and field tests show that cleaning effectiveness at the bit is directly proportional to hydraulic impact. Impact is the product of the circulating rate and the fluid velocity through the bit nozzle. Hydraulic impact will not cut hole by itself. But it will clean the bit and remove cuttings from below the bit before they can be reground.

Once there is enough hydraulic impact to clean the hole effectively, additional hydraulic impact raises penetration rates no further. At this point, the only way to speed drilling is to generate more rock chips. This can be done by speeding up the rotary table or by adding more weight to the bit by using more drill collars.

The drilling fluid. Table 1 gives the average mud properties for the wells in the study. Wells A and B were drilled with mud of relatively high viscosity, high weight, and low water loss. Such a mud was considered necessary to maintain good hole conditions. This mud program was about the same as used by other operators in the field.

In well C, mud viscosity and weight were reduced while the water loss was permitted to increase. As a result, drilling time was cut 24% under that of wells drilled prior to 1959. Fig. 2 compares drilling time versus depth.

It is also important that 250,000-p.p.m. produced salt water was used instead of fresh water to drill to 5,000 ft. Drilling rates using salt water were as good as with fresh water. Moreover, there was far less tight-hole trouble on trips because the brine inhibits or suppresses swelling of the shales.

Some had been concerned about the added weight resulting from the heavier column of fluid (salt water versus fresh water). They thought this would cause more compaction at the bit, thereby reducing the tendency for pressure to equalize around newly formed rock chips. Such an effect would retard bottomhole cleaning and cause regrinding of the cuttings. Fig. 2 shows drilling rate with salt water to 5,000 ft. on wells C, D, and E. Obviously, drilling rate was not reduced.

On wells D and E, viscosity, weight, and solids content of the mud were even further reduced while water loss

From a paper titled, "Penetration Rates Doubled by 'Applying' Known Drilling Techniques in Williston Basin," presented 1960 spring meeting of API Division of Production's Rocky Mountain district, Billings, Mont.

was permitted to increase. Water losses at one time were as high as 35 cc. This program kept the hole in a satisfactory condition at all times; the drill pipe didn't tend to stick nor was it necessary to wash to bottom after making a trip.

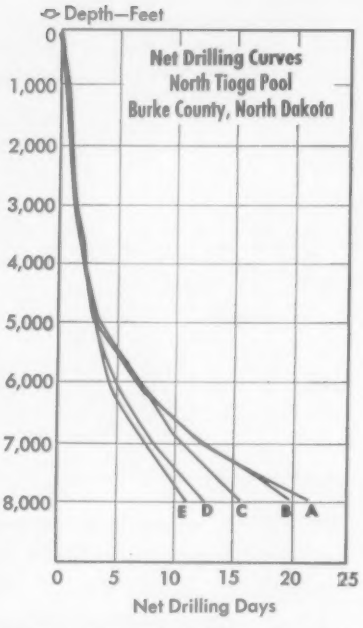
In all wells, water loss was reduced to 10 cc. or less before drilling the pay zone. This insured against water damage to the formation.

Bids and rigs. Although drilling was faster with the revised mud program on well C, drilling contractors' bids on later wells did not reflect the fact. We wanted to see what difference both a planned rig hydraulic program and the low-solids, low-viscosity mud program would make. Therefore, wells D and E were drilled on day-work contracts.

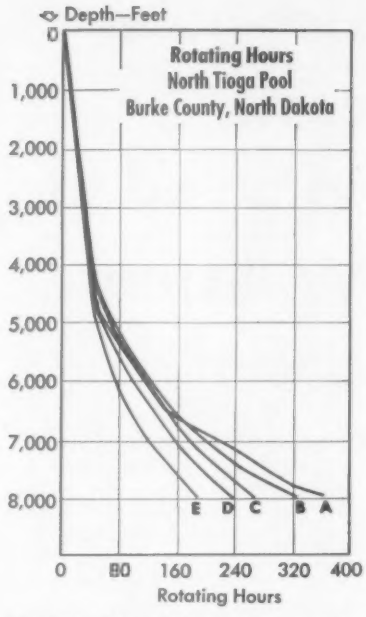
Fig. 2 compares drilling time in days versus depth for all five wells. As shown, net drilling time averaged 19.8 days for wells A and B. The mud and hydraulics program successfully cut this to 15, 12, and 10.7 days for wells C, D, and E, respectively.

The faster drilling of well D over well C was a result of slightly lower solids and lower viscosities of the drilling fluid and the jet-bit hydraulics. Wells A, B, and C were drilled with conventional bits, whereas jet bits were used on wells D and E.

Mud properties on the last two wells were essentially the same (see Table 1). Therefore, well E was faster than well D because of better rig hydraulics. That is, the rig that drilled well D was underpowered to the extent that it could not drive its 500-hp. pump fully loaded. As a result, it was futile to run more than 50,000 lb. bit weight; there wasn't enough horsepower to remove additional cuttings.



TYPICAL DRILLING TIMES in the field before the improvement campaign are those for Wells A and B. Better muds cut time in Well C. Better hydraulics made the difference in Well D and still better hydraulics resulted in the best time, that for Well E. Fig. 2.



DEEPER FORMATIONS promise most improvement from jet bits at Tioga. Rotating time on all wells was close at 4,500 ft.; below 5,500 ft., the importance of good hydraulics become obvious from fast time in Wells D and E. Fig. 3.

The rig which drilled well E had enough horsepower to drive its 600-hp. pump fully loaded. With this additional hydraulic horsepower available at the bit, it was possible to run bit weights of 65,000 lb. and effectively remove the cuttings without regrinding on bottom.

As pointed out earlier, to get the most from jet bits there must be other changes that will produce more cuttings. That is, bit weights or rotary speed or both must be raised. Fig. 3 plots rotating hours versus depth. It shows effective use of good rig hydraulics with jet bits. As shown, penetration rate for well E was actually double that of the poorest, well B.

Fig. 3 also reveals the depths in this area where good rig hydraulics and higher weights pay off most. It appears that, as harder formations are drilled at greater depths, it becomes increasingly important for each chip to be removed from bottom as the bit tears it loose. This prevents regrinding and allows the bit to continue making new chips.

TABLE 1—DRILLING-MUD CHARACTERISTICS NORTH TIOGA POOL BURKE COUNTY, NORTH DAKOTA

		Drilling-Mud Characteristics		
		Wells Drilled Prior to 1959	Wells Drilled During 1959	
Depth, Feet	Formations	A and B	C	D and E
Surface to 5,000	Shale with some sand.	Fresh water.	250,000+ p.p.m. produced salt water.	300,000 p.p.m. produced salt water.
5,400-7,000	Limestone, red beds with some shale.	Weight, 10.4 lb. per gal.; viscosity, 60 seconds; water loss, 12 cc.	Weight, 10.2 lb. per gal.; viscosity, 45 seconds; water loss, 15 cc.; solids, 15%.	Weight, 9.7 lb. per gal.; viscosity, 42 seconds; water loss, 26 cc.; solids, 6%.
7,000-7,800	Limestone, anhydrite and salt.	Weight, 10.9 lb. per gal.; viscosity, 80 seconds; water loss, 8 cc.; NaCl, 330,000 p.p.m.	Weight, 10.3 lb. per gal.; viscosity, 43 seconds; water loss, 12 cc.; solids, 10%; NaCl, 330,000 p.p.m.	Weight, 9.9 lb. per gal.; viscosity, 45 seconds; water loss, 24 cc.; solids, 7%, NaCl, 330,000 p.p.m.
7,800-8,000	Limestone and anhydrite.	Weight, 11.2 lb. per gal.; viscosity, 80 seconds; water loss, 6 cc.; NaCl, 330,000 p.p.m.		

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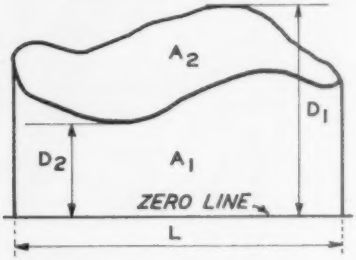
Data measurement and load calibration

BY JOSEPH ZABA

THE LOAD DIAGRAM of a dynamometer card gives the loads which are needed in designing a sucker-rod pumping installation, and in analyzing its performance.[1 2] For the card shown in Fig. 14, these loads are:



DYNAMOMETER CARD showing areas and deflections needed for calculating loads. Fig. 14.

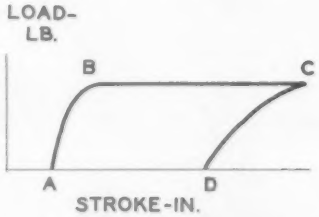
Maximum load = $C \times D_1$
Minimum load = $C \times D_2$
Range of loads = $C\ (D_1 - D_2)$

Av. upstroke load = $C\ (A_1 + A_2)/L$
Av. downstroke load = $C\ A_1/L$
where:

C = calibration constant of the dynamometer, pounds per inch of height of card
D_1 = maximum deflection, in.
D_2 = minimum deflection, in.
A_1 = lower area, in.^{2}
A_2 = upper area, in.^{2}

Pump dynagraph. While the dynamometer measures the loads in a well, it is affected by many factors that introduce forces in the rod string, sometimes well above the level of the pump. A dynagraph, on the other hand, measures the loads on the plunger alone, since the instrument is located directly above the plunger. It is useful for a detailed study of the pumping cycle.

The plunger load is found by recording the stretch of a calibrated rod installed in the sucker-rod string above the pump and coupled to the pull rod of the pump.[3 4]



BASIC pump dynagraph card (theoretical). Fig. 15.

Because its use means pulling the pump, the dynagraph is not used in routine well studies. However, its use, along with dynamometer studies, contributed to our understanding of the whole sucker-rod system.

A basic pump dynagraph card is

Table 1—Values of Expression—

SPM	LENGTH OF STROKE, in. 16	18	20	24	30	34	36	40	42	44	48	54	64	72	74
5	1.015	1.017	1.018	1.022	1.027	1.031	1.033	1.037	1.039	1.041	1.044	1.050	1.059	1.067	1.069
6	1.018	1.020	1.022	1.027	1.033	1.038	1.040	1.044	1.047	1.049	1.053	1.060	1.071	1.080	1.082
7	1.021	1.023	1.026	1.031	1.039	1.044	1.047	1.052	1.054	1.057	1.062	1.070	1.083	1.093	1.096
8	1.024	1.027	1.030	1.036	1.044	1.050	1.053	1.059	1.062	1.065	1.071	1.080	1.095	1.107	1.110
9	1.027	1.030	1.033	1.040	1.050	1.057	1.060	1.067	1.070	1.073	1.080	1.090	1.107	1.120	1.123
10	1.030	1.033	1.037	1.044	1.056	1.063	1.067	1.074	1.078	1.081	1.089	1.100	1.118	1.133	1.137
11	1.033	1.037	1.041	1.049	1.061	1.069	1.073	1.081	1.086	1.090	1.098	1.110	1.130	1.147	1.151
12	1.036	1.040	1.044	1.053	1.067	1.076	1.080	1.088	1.093	1.098	1.107	1.120	1.142	1.160	1.164
13	1.039	1.043	1.048	1.058	1.072	1.082	1.087	1.097	1.101	1.106	1.116	1.130	1.154	1.173	1.178
14	1.041	1.047	1.052	1.062	1.078	1.088	1.093	1.104	1.109	1.114	1.124	1.140	1.166	1.187	1.192
15	1.044	1.050	1.056	1.067	1.083	1.094	1.100	1.111	1.117	1.122	1.133	1.150	1.178	1.200	1.206
16	1.047	1.053	1.059	1.071	1.089	1.101	1.106	1.119	1.124	1.130	1.142	1.160	1.190	1.213	1.219
17	1.050	1.057	1.063	1.076	1.094	1.107	1.113	1.126	1.132	1.139	1.151	1.170	1.201	1.227	1.233
18	1.053	1.060	1.067	1.080	1.100	1.113	1.120	1.133	1.140	1.147	1.160	1.180	1.213	1.240	1.247
19	1.056	1.063	1.070	1.084	1.106	1.120	1.127	1.141	1.148	1.155	1.169	1.190	1.225	1.254	1.260
20	1.059	1.067	1.074	1.089	1.111	1.126	1.133	1.148	1.156	1.163	1.178	1.200	1.237	1.267	1.274

Table 2—Values of Expression—

SPM	LENGTH OF STROKE, in. 16	18	20	24	30	34	36	40	42	44	48	54	64	72	74
5	1.006	1.006	1.007	1.009	1.011	1.012	1.013	1.014	1.015	1.016	1.017	1.019	1.023	1.026	1.026
6	1.008	1.009	1.010	1.012	1.015	1.017	1.018	1.020	1.021	1.022	1.025	1.028	1.033	1.037	1.038
7	1.011	1.013	1.014	1.017	1.021	1.024	1.025	1.028	1.029	1.031	1.033	1.038	1.044	1.050	1.051
8	1.015	1.016	1.018	1.022	1.027	1.031	1.033	1.036	1.038	1.040	1.044	1.049	1.058	1.065	1.067
9	1.018	1.021	1.023	1.028	1.034	1.039	1.041	1.046	1.048	1.051	1.055	1.062	1.074	1.083	1.085
10	1.023	1.026	1.028	1.034	1.043	1.048	1.051	1.057	1.060	1.062	1.068	1.077	1.091	1.102	1.105
11	1.027	1.031	1.034	1.041	1.051	1.058	1.062	1.069	1.072	1.076	1.082	1.093	1.110	1.124	1.127
12	1.033	1.037	1.041	1.049	1.061	1.069	1.074	1.082	1.086	1.090	1.098	1.110	1.131	1.147	1.151
13	1.038	1.043	1.050	1.056	1.072	1.082	1.086	1.096	1.101	1.105	1.115	1.129	1.153	1.173	1.177
14	1.044	1.050	1.056	1.067	1.083	1.095	1.100	1.111	1.117	1.122	1.133	1.150	1.178	1.200	1.206
15	1.051	1.057	1.064	1.077	1.096	1.109	1.115	1.128	1.134	1.140	1.153	1.172	1.204	1.230	1.236
16	1.058	1.065	1.073	1.087	1.109	1.123	1.131	1.145	1.153	1.160	1.174	1.196	1.232	1.261	1.269
17	1.066	1.074	1.082	1.098	1.123	1.139	1.148	1.164	1.172	1.180	1.197	1.221	1.262	1.295	1.303
18	1.074	1.083	1.092	1.110	1.138	1.156	1.165	1.184	1.193	1.202	1.221	1.248	1.294	1.331	1.340
19	1.082	1.092	1.102	1.123	1.154	1.174	1.184	1.205	1.215	1.225	1.246	1.277	1.328	1.369	1.379
20	1.091	1.102	1.113	1.136	1.170	1.193	1.204	1.227	1.238	1.250	1.272	1.306	1.363	1.408	1.420

shown in Fig. 15. Point A denotes the beginning of the upstroke when the traveling valve closes. The standing valve is still closed because of the pressure of gas in the clearance space. From A to B, while the fluid load is transferred to the rods, the gas in the clearance space expands.

At B the pressure in the clearance space becomes lower than the pressure outside of the pump, the standing valve opens, and fluid begins to enter the pump. (When a pump handles a gas-free fluid with 100% volumetric efficiency, the curve A-B is a straight vertical line from A.) From B to C, the rest of the upstroke, all of the fluid load is on the rods.

At C, the beginning of the downstroke, the standing valve closes but the traveling valve remains closed, while the gas is being compressed in the pump barrel. The fluid load is gradually transferred to the tubing.

At D the gas pressure within the pump becomes larger than the static pressure of the fluid in the tubing and the traveling valve opens. (With a gas-free fluid at 100% efficiency, C-D would be a straight vertical line down from C). From D to A the plunger travels through the fluid back to the beginning of the cycle.

Typical dynagraph cards will be shown later along with a discussion of specific problems.

Calculation of loads. Measurement with a dynamometer is the only accurate method of finding pumping loads. Sometimes, however, these loads have to be calculated from given and assumed data. Such is the case when designing a new pumping installation. No measurements can be made unless a temporary installation is used. This, however, seldom happens in actual practice and in most cases new installations are designed from calculated data.

During years of study of the subject, several formulas have been developed for calculating polished-rod loads. Some of them tried to include as many as possible of the factors affecting rod loadings. As a result they were too complex. Others, based on a number of simplifying assumptions, were quite simple.

There would be no objection to the complexity of a formula if it gave rigidly correct results. This, however, is not the case, because (1) using some of the more complex parameters requires the making of some simplifying assumptions, (2) some of the factors can not be included even in the most complex formulas. Because of this, the formulas which became generally accepted during the last 30 years are characterized by their simplicity. In checks with actual load measurements the formulas have been proven to be within the range of practical accuracy.

Analog studies have already been mentioned. Other studies, using digital computers, are being conducted by some universities and by research departments of some oil companies.[5] Until all these studies yield some results that can be checked by general field use, the existing formulas must be used to give reasonably satisfactory answers.

Maximum loads. The two formulas used for calculation of polished-rod loads are those developed by J. C. Slonneger and Kenneth N. Mills. The Slonneger formula is:

$$P = (W_r + W_f)(1 + S \times SPM)/5400$$

Where:

P = peak polished-rod, lb.
W_r = weight of rod string, neglecting buoyancy, lb.
W_f = weight of fluid load, lbs. = $0.34D^2L$
D = effective diameter of plunger, in.
L = depth of pump, ft.
S = polished-rod stroke, in.
SPM = strokes per minute.

This formula neglects both buoyancy and friction, assuming that they approximately offset each other.

In checks with actual load measurements, the formula proved to be reasonably accurate, on the conservative side, for normal well depths and for slow pumping speeds. For higher speeds, the formula appears to give values too low. It has been suggested by some that for such speeds a safety factor of 1.6 be applied to the formula.

Table 1 gives values of expression $1 + S \times SPM/5400$ for different lengths of stroke and different speeds of pumping. This table, and Table 2, have been calculated for lengths of stroke adapted for the new API Standard Pumping-Unit Series (Tentative) published in March 1960.

$$P = W_f + W_r(1 + SN^2)/70{,}500$$

Where:

P = peak polished-rod load, lb.
W_f = weight of fluid, lb.
W_r = weight of rods in air, lb.
S = polished-rod stroke, in.
N = number of strokes per minute.

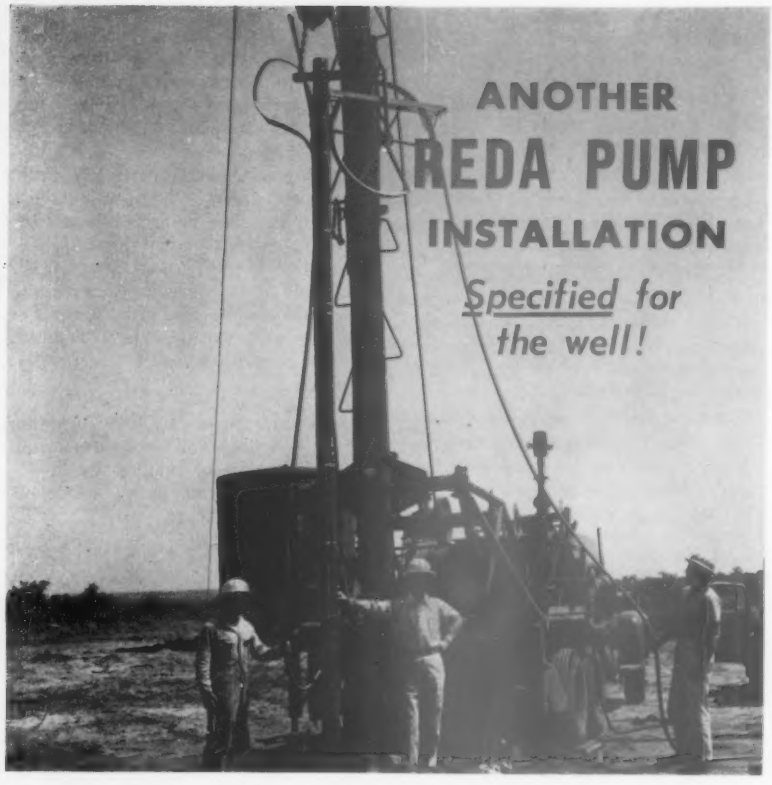
Weight of fluid is the pressure exerted on the net area of the plunger; that is, the area of the plunger less the average area of the rods.

$1 + S \times SPM/5{,}400$

84	86	96	100	108	120	144	168	180	192	240
1.078	1.080	1.089	1.093	1.100	1.111	1.133	1.156	1.167	1.178	1.222
1.093	1.096	1.107	1.111	1.120	1.133	1.160	1.187	1.200	1.213	1.267
1.109	1.111	1.124	1.130	1.140	1.156	1.187	1.218	1.233	1.249	1.311
1.124	1.127	1.142	1.148	1.160	1.178	1.213	1.249	1.267	1.284	1.356
1.140	1.143	1.160	1.167	1.180	1.200	1.240	1.280	1.300	1.320	1.400
1.156	1.159	1.178	1.185	1.200	1.222	1.267	1.311	1.333	1.356	1.444
1.171	1.175	1.196	1.204	1.220	1.244	1.293	1.342	1.367	1.391	1.489
1.187	1.191	1.213	1.222	1.240	1.267	1.320	1.373	1.400	1.427	1.533
1.202	1.207	1.231	1.241	1.260	1.289	1.347	1.404	1.433	1.462	1.578
1.218	1.223	1.249	1.259	1.280	1.311	1.373	1.436	1.467	1.498	1.622
1.233	1.239	1.267	1.278	1.300	1.333	1.400	1.467	1.500	....	....
1.249	1.255	1.284	1.296	1.320	1.356	1.427	1.498	1.533	....	....
1.264	1.271	1.302	1.315	1.340	1.378	....	....	....	....	....
1.280	1.287	1.320	1.333	1.360	1.400	....	....	....	....	....
1.296	1.303	1.338	1.352	1.380	1.422	....	....	....	....	....
1.311	1.319	1.356	1.370	1.400	1.444	....	....	....	....	....

$1 + SN^2/70{,}500$

84	86	96	100	108	120	144	168	180	192	240
1.030	1.030	1.034	1.035	1.035	1.043	1.051	1.060	1.064	1.068	1.085
1.043	1.044	1.049	1.051	1.055	1.061	1.074	1.086	1.092	1.098	1.123
1.058	1.060	1.067	1.070	1.075	1.083	1.100	1.117	1.125	1.133	1.167
1.076	1.078	1.087	1.091	1.098	1.109	1.131	1.153	1.163	1.174	1.218
1.097	1.099	1.110	1.115	1.124	1.138	1.165	1.193	1.207	1.221	1.276
1.119	1.122	1.136	1.142	1.153	1.170	1.204	1.238	1.255	1.272	1.340
1.144	1.148	1.165	1.172	1.185	1.206	1.247	1.288	1.309	1.330	1.412
1.172	1.176	1.196	1.204	1.221	1.245	1.294	1.343	1.368	1.392	1.490
1.201	1.206	1.230	1.240	1.259	1.288	1.345	1.403	1.431	1.460	1.575
1.234	1.239	1.267	1.278	1.300	1.334	1.400	1.467	1.500	1.534	1.667
1.268	1.274	1.306	1.319	1.345	1.383	1.460	1.536	1.574	....	....
1.305	1.312	1.349	1.363	1.392	1.436	1.523	1.610	1.654	....	....
1.344	1.353	1.394	1.410	1.443	1.492	....	....	....	....	....
1.386	1.395	1.441	1.460	1.496	1.551	....	....	....	....	....
1.430	1.440	1.492	1.512	1.533	1.614	....	....	....	....	....
1.477	1.488	1.545	1.567	1.613	1.681	....	....	....	....	....



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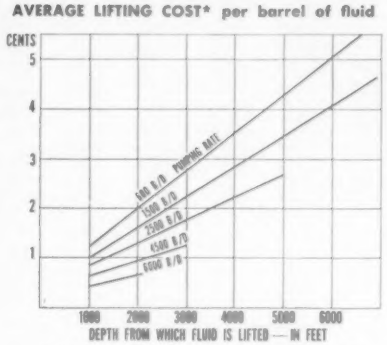
Billions of barrels of fluid (oil and water) have been produced at an average lifting cost of less than one cent per barrel for each 1,000 foot lift. Chart "A" illustrates average lifting cost from 600 B/D to 6,000 B/D using Reda Submergible Pumps.

Most complete submergible pump line for producing oil wells, water supply wells, brine wells, etc. Sizes range from 5 to over 240 h.p. . . . models for wells cased with 4", 5½", 6⅝", 7" or 9⅝" casing . . . for depths from 500 to 10,000 feet, and for capacities of 100 bbl. to over 18,000 bbl. per day.



*Included: Electric Energy (1D Mills Per KWH), Run and Pull, Repairs, Upkeep, Transportation, Labor and Amortization (8 Yrs.)

Chart "A"

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Pumps for Oil, Brine, Water, Gasoline, Jet Fuel, Chemicals, LPG

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The main assumption in this formula is that the acceleration of fluid contributes little if anything to the peak polished-rod load. This assumption is justified by two facts; (1) by the difference in the rate of stress transmission, in rods around 16,000 ft. per second, and in the fluid averaging around 4,000 ft. per second, and (2) by the high compressibility of the pumped fluid. The rod acceleration is based on the peak acceleration of simple harmonic motion.

The check of the formula with actual measurements showed it to be reasonably accurate, particularly for deeper wells and for higher speed of pumping.

Table 2 gives the values of expression, $1 + SN^2/70{,}500$ for different lengths of stroke and different speeds of operation.

Minimum loads. The formula in general use for calculation of these loads assumes that the decrease of rod load on the downstroke due to acceleration equals the increase in the load due to acceleration on the upstroke. The formula also includes the effect of buoyancy. On the upstroke, buoyancy and friction are acting in opposite directions and are assumed to offset each other. On the downstroke, buoyancy and friction are acting in the same direction.

Using the impulse factor of the Mills formula, the equation for minimum load during the downstroke is:

$$M = W_r\,(1 - SN^2)/70{,}500 - CW_r$$

Where:

M = minimum polished-rod load, lb.
W_r = weight of rods, lb.
S = polished-rod stroke, in.
N = strokes per minute.
C = ratio of density of fluid to density of steel

If the pumped fluid is assumed to be water then $C = 62.5/490 = 0.127$ and the formula becomes:

$$M = W_r\,(0.873 - SN^2)/70{,}500$$

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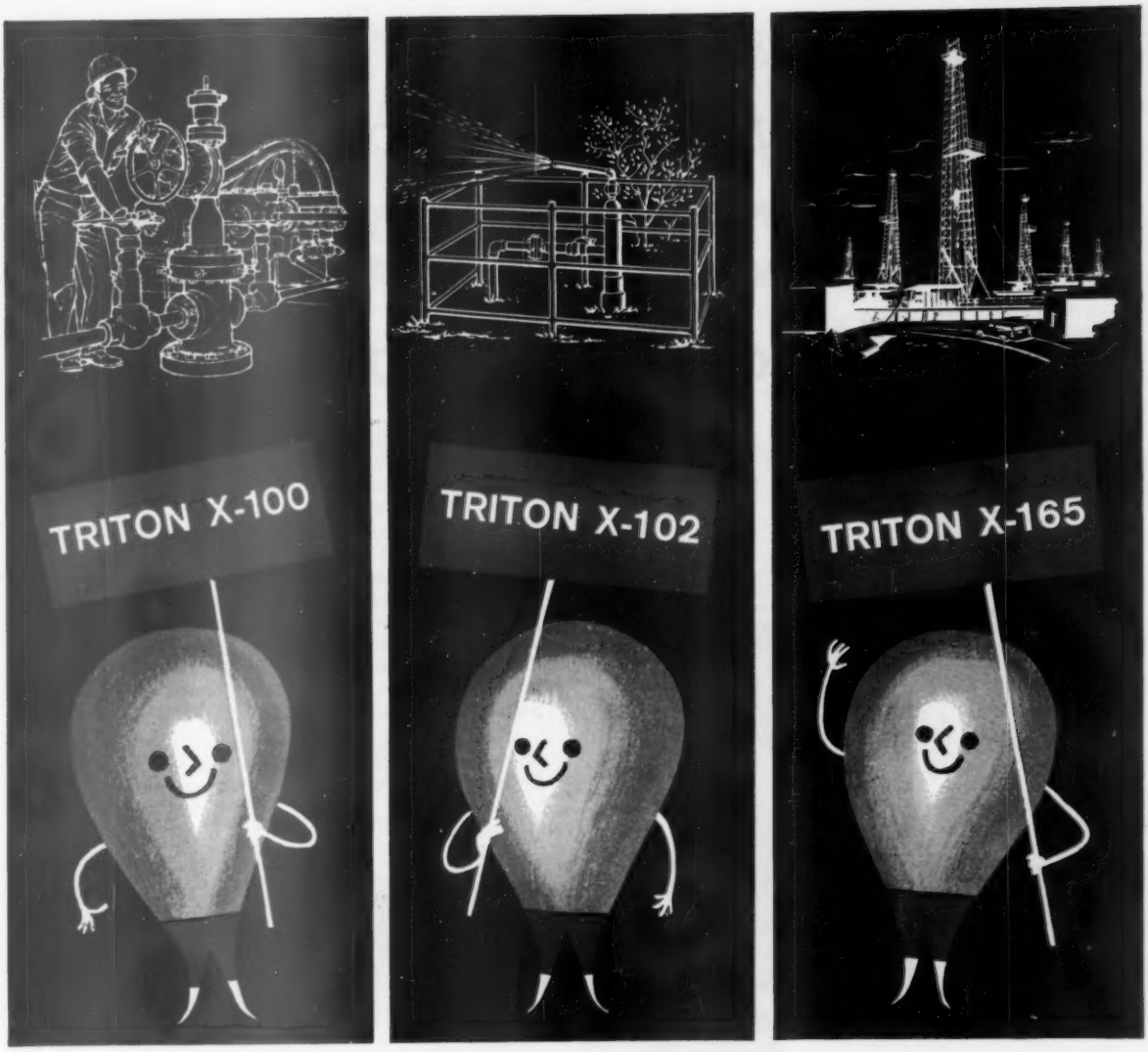

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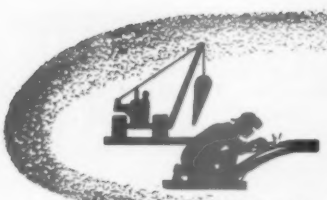

Monthly Report on PIPELINE CONSTRUCTION

PIPELINE ACTIVITY reported here is compiled from surveys by The Oil and Gas Journal among pipeline companies and construction contractors.

This summary report appears in the last issue of the Journal each month. New construction projects are reported weekly in Pipeline Briefs in the Journal's news section.

Projects are listed in three groups—U. S., Canadian, and Foreign—and according to type of line—crude, products, or natural gas.

★ The star symbol indicates the first appearance of the project in the Journal's survey.

U.S. Crude Oil Pipelines

BELLE FOURCHE PIPELINE CO., Box 1612, Casper, Wyo.
Project: 103-mile 8-in. line from Fiddler Creek field to Lance Creek, Wyo., and other lines to serve Roset, Miller Creek, and Lone Tree fields.
Status: Pending approval of Wyoming Public Service Commission.

BUCKEYE PIPE LINE CO., 30 Broad St., New York 4, N. Y.
Project: 54 miles of large-diameter extension in Michigan. The 22-in. line will be extended from Toledo to Samaria, and a 16-in. line will be built from Samaria to Trenton and Detroit.
Status: Under way.
Contractors: Awards made on two of the three sections to Panama-Williams Corp., Houston, and Somerville Construction Co., Ada, Mich.
Completion: Late summer 1960.

CAPE PIPE LINE CO. (Sun Oil Co., Cities Service Co., Atlantic Refining Co.), Philadelphia.
Project: Line from lower Delaware Bay to Philadelphia.

GILLETTE PIPELINE, INC., and A. W. HARTWIG, INC.
Project: A 102-mile line from Dead Horse Creek field to Casper, Wyo.
Status: Pending Wyoming Public Service Commission approval.

GREAT NORTHERN RAILWAY, St. Paul.
Project: 110-mile line from Lignite and Newburg fields to Minot, N. D.
Completion: Before next winter.

GULF REFINING CO., Drawer 2100, Houston 1, Tex.
Project: 23 miles of reroute of 10-in. near Carlyle, Ill.
Completion: December 1960.

INTERNATIONAL OIL PIPELINE CORP., New York.
Project: Would own U. S. section of 1,500-mile, 30-in. line proposed by Mid-Continent Pipe Lines, Ltd., from Edmonton, Alta., to Chicago. (See Canada).
Status: Proposed.

MATADOR PIPE LINE CORP., Denver.
Project: 175-mile line from Burke, Bottineau, and Renville counties, North Dakota, to Cromer, Man.
Status: Pending approval of Canadian National Energy Board.

NORTHWESTERN REFINING CO., Box 248, St. Paul Park, Minn.
Project: Gathering system in Rival and Lignite fields, North Dakota.
Status: Has state approval.

SERVICE PIPE LINE CO., Box 1979, Tulsa 2, Okla.
★ Projects: 49 miles of 2 to 16-in. gathering line to connect new leases.
Completion: Summer and fall 1960.

SHELL PIPE LINE CORP., Box 2648, Houston 1, Tex.
Project: 4½ miles of 8-in. and 6½ miles of 6-in. from East and West Burrwood fields, Louisiana, to existing 8-in. line near Delta Pipe Line's Southwest Pass station.
Completion: October 1960.

STANDARD OIL CO. OF CALIFORNIA, San Francisco.
Project: 22 miles of 8-in. from Swanson River Unit to Nikiski on Cook Inlet, Alaska.
Status: Under way.
Contractors: Sharman, Allen, Gay & Taylor, Inc., Houston.
Completion: Mid-1961.

U. S. Products Pipelines

CENEX PIPELINE CO., subsidiary of Farmers Union Central Exchange, Inc., Box G, St. Paul 1, Minn.
Project: 200-mile 8-in. line in Montana and North Dakota.
Contractors: D. Michael Curran & Co., Great Falls, Mont.; and C. E. Wilson Construction Co., Kansas City.
Completion: Fall 1960.

CONTINENTAL PIPE LINE CO., Drawer 1267, Ponca City, Okla.
Project: 85-mile 6-in. line from Helena to Great Falls, Mont.
Status: Under way.
Contractor: R. H. Fulton & Co., Lubbock, Tex.
Completion: By September 1, 1960.

GREAT LAKES PIPE LINE CO., Drawer 2239, Kansas City 42, Mo.
Project: 60 miles of 8-in. from Grinnell to Waterloo, Iowa.
Status: Under way.
Contractor: Shamrock Constructors, Inc.

HUSKY OIL CO., Cody, Wyo.
Project: About 100 miles from Cody to the Yellowstone products line west from Billings, Mont.
Contractor: W. E. Claycomb & Son Construction Co., Cody.
Completion: By October 15, 1960.

MID-AMERICA PIPELINE CO., (Missouri-Kansas-Texas Railroad), New York.
Project: 2,300-mile LPG system from West Texas-New Mexico area to upper Midwest. Size of pipe would be 8 and 10-in. with branches 6 to 8-in.
Status: Under way.
Contractor: Williams Brothers Co., Tulsa.
Completion: December 1960.

NEW HAVEN PIPELINE, INC., 515 Madison Ave., New York 22, N. Y.
Project: 12-in. line from New Haven to Hartford, Conn., and 10-in. from there to Springfield, Mass., with a 6-in. spur to Westover Air Base at Ludlow, Mass.
Status: Proposed.

PHILLIPS PETROLEUM CO., Bartlesville, Okla.
★ Project: 34 miles of 6-in. from Crane to Benedum, Tex.
Status: Under way.
Contractor: McVean & Barlow.
Completion: August 1960.

PLANTATION PIPE LINE CO., Box 1743, Atlanta 1, Ga.
★ Project: Replacing 73 miles of 4-in. line with 8-in. between Helena and Montgomery, Ala.
Completion: October 1, 1960.

SEADRIFT PIPELINE CORP. (subsidiary of Union Carbide Corp.).
Project: 108 miles of line from Seadrift to Ella, Tex.
Status: Under way.

SIBON PIPE LINE CO., Houston.
Project: 16 miles of 8-in. natural-gas liquids line from Bayou Pigeon to Lake Fausse Point, Iberia Parish, Louisiana.

STANDARD OIL CO. OF CALIFORNIA, 225 Bush St., San Francisco.
Project: 20 miles of twin 8-in. line from new Hawaiian refinery to Honolulu.
Status: Under way.
Contractor: Bechtel Corp., San Francisco.

TEXAS EASTERN TRANSMISSION CORP., Box 1189, Houston. (Jointly with Buckeye Pipe Line Co.)
Project: 90-mile extension of Little Big Inch from Lebanon to Lima, Ohio.
Completion: Fall 1960.
★ Project: 10 miles of 10-in. from Baytown to Mont Belvieu, Tex.
Status: Planned.
Completion: November 1960.

U. S. Natural Gas Pipelines

ALASKA PIPE LINE CO., Houston, Tex.
Project: 82 miles from Kenai Unit gas field to Anchorage.
Status: Under way.
Contractors: Williams Brothers Co., Tulsa, has contract for 74 land miles, and Sharman, Allen, Gay & Taylor, Inc., Houston, has an 8½-mile water crossing.
Completion: By October 1960.

AMERE GAS UTILITIES CO., Box 1273, Charleston 25, W. Va.
Project: 16 miles of 10-in. from Carbon to Wingrove, W. Va.
Completion: Late summer 1960.
Completion: Late October 1960.

ARKANSAS INDUSTRIAL PIPELINE CORP. (Arkansas Louisiana Gas Co.), Shreveport.
Project: 130 miles of 18-in. from Perla to Helena, Ark.
Contractor: Pentzien, Inc., Omaha, has contract for dual crossing on the Ar-

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PIPELINE CONSTRUCTION

kansas River near Wright.
Completion: Fall 1960.

ARKANSAS LOUISIANA GAS CO., Shreveport.
Project: About 58 miles of 2, 3, 4, and 6-in. line in various locations.
Completion: 1960.

ATLANTIC SEABOARD CORP., Box 1273, Charleston 25, W. Va.
Project: 45 miles of 20-in. from Terra Alta storage site to Seneca station, W. Va.
Status: Under way.
Contractor: Williams Brothers Co., Tulsa.
Completion: September 1, 1960.

CENTRAL HUDSON GAS & ELECTRIC CORP., South Road, Poughkeepsie, N. Y.
Project: 16 miles of 10-in. from Sleightsburgh to Highland, N. Y.
Status: Under way.
Contractor: C. N. Flagg & Co., Meriden, Conn.
Completion: September 1960.

CENTRAL ILLINOIS PUBLIC SERVICE CO., 607 East Adams St., Springfield, Ill.
★ Project: 20 miles of 10-in. from the Tuscola area to the Mattoon and Charleston areas.
Completion: Fall 1960.

CITIES SERVICE GAS CO., Box 1995, Oklahoma City 1, Okla.
Project: 6 miles of 6-in. at St. Joseph, Mo.
Status: Pending FPC approval.
Project: 2 miles of 20-in. at Independence, Kans.
Status: Pending FPC approval.
Project: 13 miles of 16-in. from Alden field, Rice County, Kansas, to the company's Lyons station and 10 miles between Lyons and Wherry.
Status: Approved.

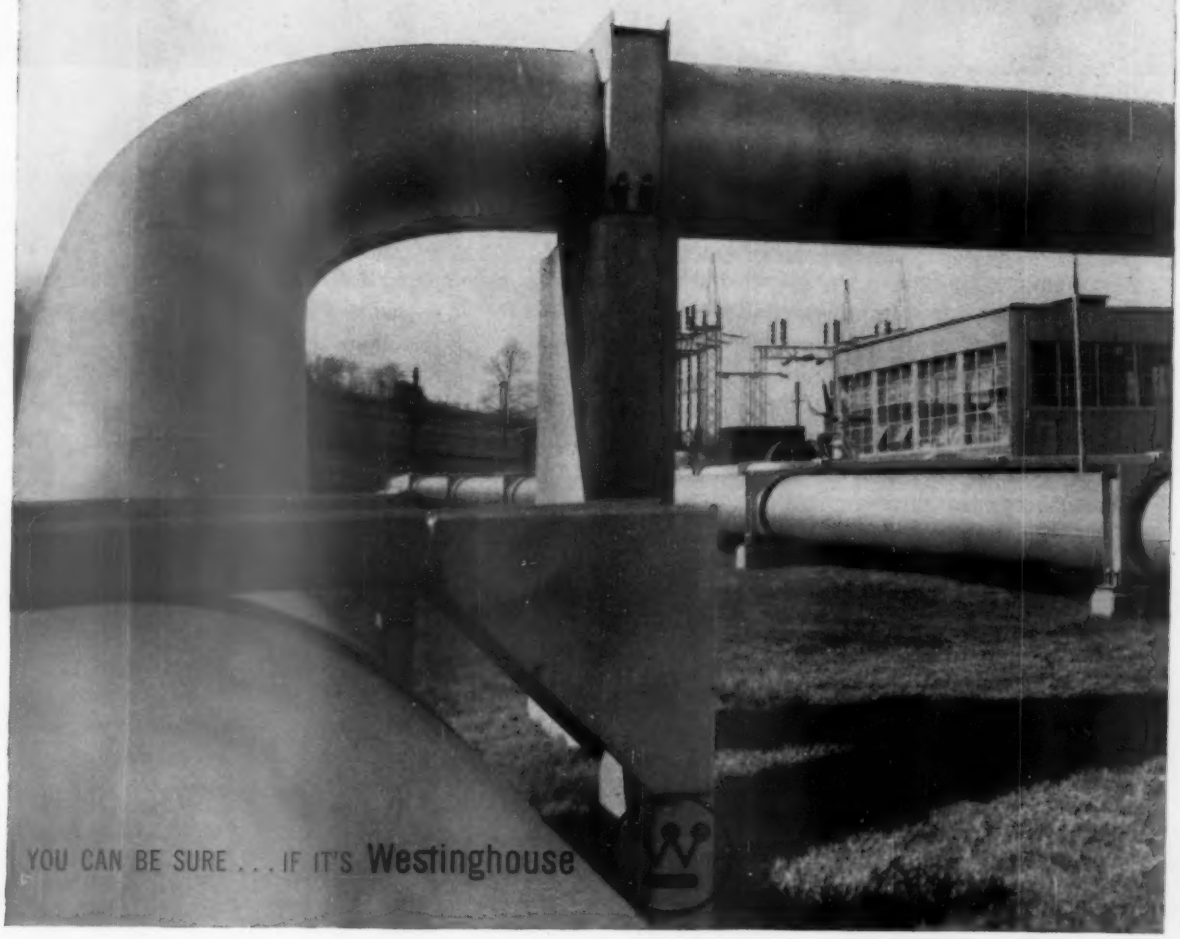
COASTAL STATES GAS PRODUCING CO., 200 Petroleum Tower, Corpus Christi, Tex.
Projects: 30 miles of 8-in. and 30 miles of 6-in. from La Salle County to Pearsall, Tex., and 25 miles of 8-in. from Jim Wells County to Agua Dulce.
Contractor: Adair Pipeline Co.
Completion: Fall 1960.
Projects: 30 miles of 12-in. from Jim Wells County to the May field, Texas, area, and 230 miles of 4 to 20-in. from Live Oak County to Lavaca County.
Status: Pending FPC approval.
Project: 40 miles of 4 to 14-in. from Jim Hogg County to Zapata County, Texas.
Status: Planned.

COLORADO INTERSTATE GAS CO., Box 1087, Colorado Springs.
Project: 7 miles of 20-in. in Texas Panhandle.
Status: Pending FPC approval.
Completion: 1960.
Project: 109 miles of 26-in. from Texas Panhandle to southeastern Colorado; 134 miles of 34-in. from there to Pueblo, and 107 miles of 30-in. on to Denver; 155 miles of 34-in. from Green River, Wyo., to Provo, Utah.
Status: Pending FPC approval.
Completion: 1960.
Project: 32 miles of 6-in. from Central Colorado to Trinidad.
Status: Pending FPC approval.
Completion: 1960.

COLORADO OIL & GAS CORP., Denver.
Project: 402-mile line from Gubik field to Fairbanks, Alaska.
Status: Proposed.

COLUMBIA GULF TRANSMISSION CO., Box 683, Houston, Tex.
Project: 6 miles of 24 and 30-in. at Mis-

TEXAS EASTERN TRANSMISSION CORPORATION OBTAINS DEPENDABILITY, SAFETY AND ECONOMY OF OPERATION FROM WESTINGHOUSE EQUIPMENT



WESTINGHOUSE EQUIPMENT KEEPS MT. PLEASANT

Texas Eastern's Mt. Pleasant station maintains a constant pressure of more than 900 psi on a pair of 30" pipelines to move gas some 60 miles to Gladeville, Tennessee. It forms a link in a pipeline system stretching from the Mexican border to Linden, New Jersey.

Westinghouse equipment was installed in this natural gas pumping station when it was constructed four years ago. "When the station was recently expanded to double its capacity, Westinghouse equipment was specified again. It has given dependable, safe service," asserts E. E. Blankenship, Station Chief.

The two Westinghouse transformers receive bulk power at 161,000 volts and reduce it to 4160 volts for direct utilization by a pair of 15,000-hp Westinghouse motors which supply the main power for the station's two huge compressors. The 900-rpm synchronous motors are coupled to speed increasers that step up the operating speed to 6500 rpm.

Two 225-kva transformers, also located in the main switchyard, supply the station's auxiliary system with 480 volts for blower fans, lube and seal pumps, lighting and the main control system. Stand-by pumps, to take over during a shutdown of one of the larger motors, are also supplied by the distribution circuit.

Centralized direction of the pumping station equipment is handled from the Westinghouse Control Console. A built-in safety system prevents compressor operation if oil temperature and pressure are not at a proper operating level.

Automatic sequence control systems form a sound basis for a new concept initiated by Westinghouse to help pipeline operators gain increased system efficiency while holding costs to a minimum. *Progressive Automation* is a long-term, step-by-step plan leading to economical automatic operation. Your nearby Westinghouse representative is ready now to help you formulate your individual *Progressive Automation* plan. Contact him today . . . or write Westinghouse Electric Corporation, Box 868, Pittsburgh 30, Pa.

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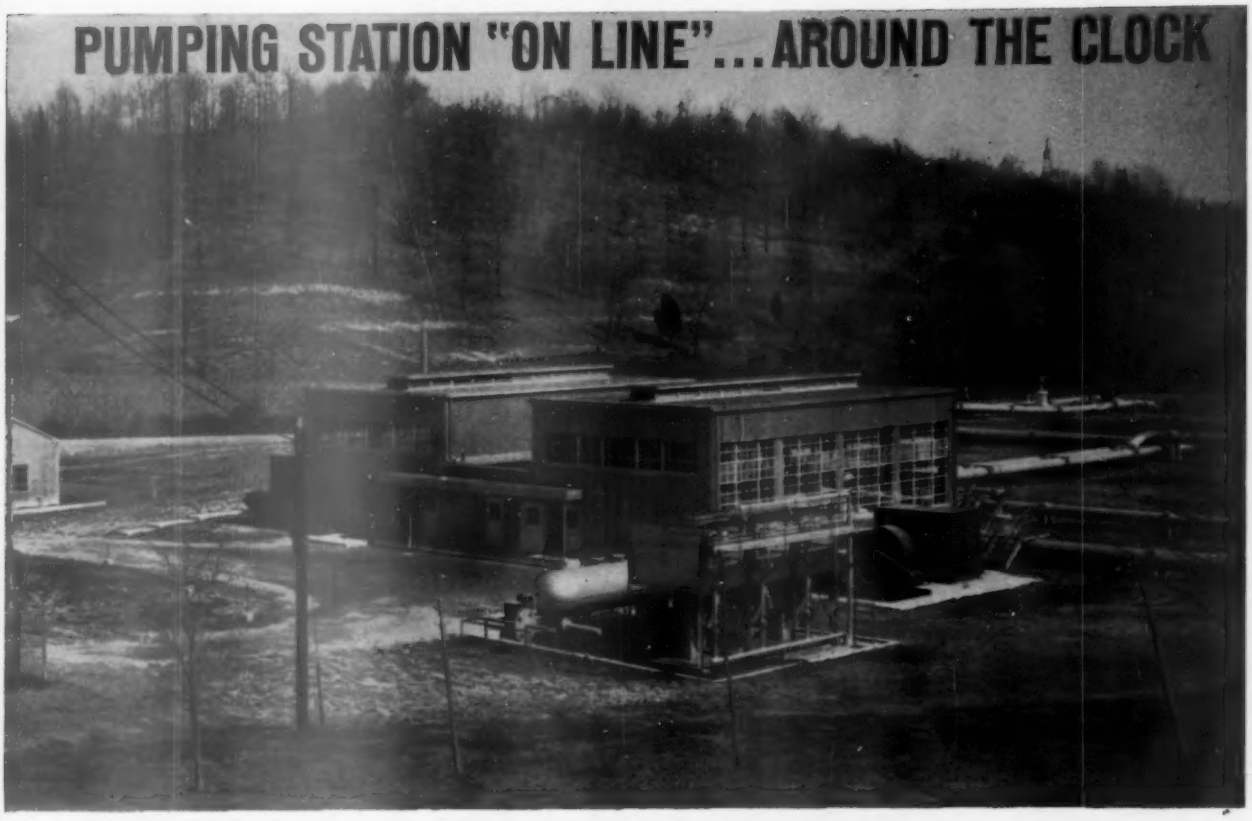
(*continued*)

PUMPING STATION "ON LINE"...AROUND THE CLOCK



EXCITER UNIT in the foreground excites the Westinghouse 15,000-hp main drive motor at one side of the Mt. Pleasant pumping station. E. E. Blankenship inspects the Westinghouse synchronous motor which is directly coupled to the gear unit to increase output from 900 to 6500 rpm. Equipment is duplicated for the second pumping unit.

ALL MOTOR CONTROL DEVICES are contained in this compact Westinghouse Control Center. Centralized location permits operators to quickly spot electrical faults. Front accessible cubicles speed inspection or repairs. Unit also contains instrumentation panel and relays to automatically regulate drive motors and compressor.

A SINGLE PUSHBUTTON on the operator's console initiates the automatic compressor start-up. A train of relays automatically sequence the pickup of station equipment step by step . . . while continually monitoring the pressures, speeds and other relevant factors. Approximately 10 to 12 minutes elapse before the station goes on line.

ELECTRICAL SYSTEM CONTROL is provided by the Westinghouse outdoor, metal-clad switchgear. Type DH horizontal drawout air circuit breakers in these cubicles protect the station transformers against possible faults on the secondary distribution system. Here Station Chief E. E. Blankenship checks the voltage level on the instrument panel. Cubicle also contains relays and metering equipment.

TEXAS EASTERN TRANSMISSION CORPORATION SPECIFIES WESTINGHOUSE *(continued)*

Main power for station is received at the substation switchyard. Westinghouse supplied the complete station, including the standardized overhead structure. Bulk power at 161,000 volts is received from the electric utility. Power circuit breakers and lightning arresters protect the transformers against faults on the utility line. The Westinghouse transformers reduce the voltage to 4160 volts to supply the 15,000-hp drive motors. J-96150

Westinghouse

PROTECTION AGAINST ACCUMULATING GAS within the main drive motor enclosure—and motor cooling—is provided by the separately mounted, motor-driven blower. This maintains the operating temperature level of the main rotating apparatus at a point that virtually eliminates the possibility of spontaneous combustion.

CIRCUIT ISOLATION is provided by the 161-kv power circuit breaker so that the electrical equipment can be inspected or switchyard maintenance performed. After interrupting power to the station, the overhead switches can be operated from the ground to isolate either of the substation transformers and the electrical circuit beyond each unit. The self-supporting lightning protectors are insurance against a direct strike on the substation.

PIPELINE CONSTRUCTION

sissippi River crossing near Providence, La.
Status: Approved by FPC.
Completion: November 15, 1960.

EL PASO NATURAL GAS CO., Box 1492, El Paso, Tex.
Project: 17 miles of 30-in. near Spokane, Wash.
Status: Pending FPC approval.
Completion: Not known.
Project: 17 miles of 8-in. in the Klamath Falls, Ore., area.
Status: Pending FPC approval.
Completion: Fall 1960.
Project: About 121 miles of 10 to 20-in. line from mainline in Oregon to Portland and Eugene.
Status: Temporarily approved by FPC.
Contractor: Hood-Rivers Associates.
Completion: Fall 1960.
Project: Permian-San Juan crossover loop, involving 119 miles of 30-in.
Status: Pending FPC approval.
Completion: 1961.
Project: Permian-San Juan crossover loop, involving about 30 miles of 30-in.
Status: Approved by FPC.
Contractor: R. H. Fulton & Co., Lubbock, Tex.
Completion: 1960.
Project: 34 miles of 20-in. from Puckett tie-in to Goldsmith, Tex.
Status: Pending FPC approval.
Completion: 1961.
Project: 51 miles of 20-in. from Terrell to Puckett.
Status: Temporarily approved by FPC.
Contractor: Western Pipe Line, Inc., Austin, Tex.
Completion: Fall 1960.
Project: 23 miles of 20-in. from Goldsmith to the Eunice-Plains line, and 395 miles of 34-in. from Thistle, Utah, to near Las Vegas, Nev.
Status: Pending FPC approval.
Completion: 1961.
Project: Loop on the San Juan mainline, involving 27½ miles of 34-in.
Status: Temporarily approved by FPC.
Completion: Not known.
Project: About 228 miles of 30-in. from Coquat to Sonora, Tex.
Status: Pending FPC approval.
Completion: Not known.

EQUITABLE GAS CO., 420 Boulevard of the Allies, Pittsburgh, Pa.
Project: 3½ miles of 20-in. in Greene County, Pennsylvania.
Status: Temporarily approved by FPC.
Contractor: Joyce Pipeline Co., Andover, N. Y.
Completion: October 31, 1960.
Project: 17 miles of 16-in. in Marion and Monangalia counties, West Virginia.
Status: Temporarily approved by FPC.
Contractor: Joyce Pipeline Co., Andover, N. Y.
Completion: October 31, 1960.

HOPE NATURAL GAS CO., Clarksburg, W. Va.
★ Project: 19 miles of 20-in. in West Virginia.
Contractor: M. & R. Pipeliners, Inc.
Completion: 9 miles will be completed by August 1 and the remainder in September 1960.
Contractor: Sheppard-Geiger Construction Co., Corpus Christi, Tex.

HOUSTON TEXAS GAS & OIL CORP., Box 10400, St. Petersburg 33, Fla.
Project: 235 miles of 2 to 6-in. lateral lines.
Status: Pending FPC approval.

IRON RANGES NATURAL GAS CO., St. Paul.
Project: 79 miles of 10 and 12-in. from Grand Rapids to Hoyt Lake, Minn.,

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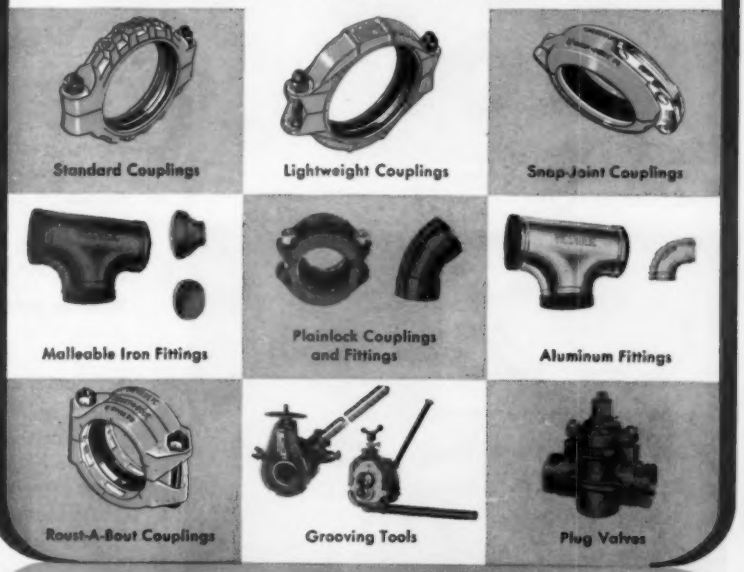

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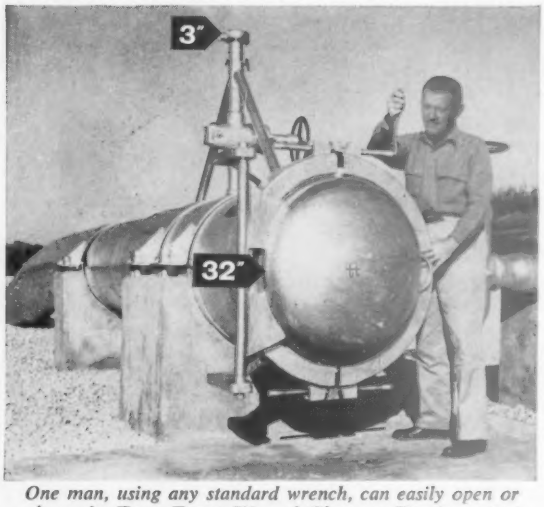

One man, using any standard wrench, can easily open or close the TUBE-TURN *Hinged Closure. Has important safety features, too!*

Tube Turns announces a new line of hinged closures with important advantages for pipe lines, piping and process equipment wherever frequent access is required or where the use of blind flanges would be cumbersome and time consuming. Proved in scores of applications by major companies, the unique TUBE-TURN* Hinged Closure provides these benefits:

Saves installation time. Light weight assembly easier to handle. Completely fabricated . . . ready to install. Requires only one butt-weld to join to pipe, tank or vessel opening.

Saves operating cost. One man, using a standard wrench, can easily open or close the largest size closure in a few minutes. No threads or lugs to engage or flanges to line up. No parts to fail. No hammering or tugging. Can be adapted to motorized operation. Closures for vertical applications can have counterbalanced caps for easy operation.

Saves on maintenance. Oil resistant, self-energizing static "O" ring provides seal. Does not move when cover is opened or closed. No rubbing or chafing to shorten seal life.

Built-in safety. Exclusive design features of two-piece yoke, double-ended right- and left-hand threaded bolts and hinged cap guard against accidental opening under pressure.

These new TUBE-TURN Hinged Closures provide still another *plus value* you can get when you specify TUBE-TURN products and buy them from your nearby Tube Turns' Distributor. They are available in sizes 2″ through 42″ for A.S.A. 150-lb, 300-lb and 600-lb service . . . in steel or alloys.

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TURNS...

Above: 32-inch TUBE-TURN Hinged Closure. This type with right-and-left hand threaded yoke bolts is available in sizes 8" thru 42". *Left:* Single bolt type closure is available in sizes 2" thru 8", removable or swing bolt.

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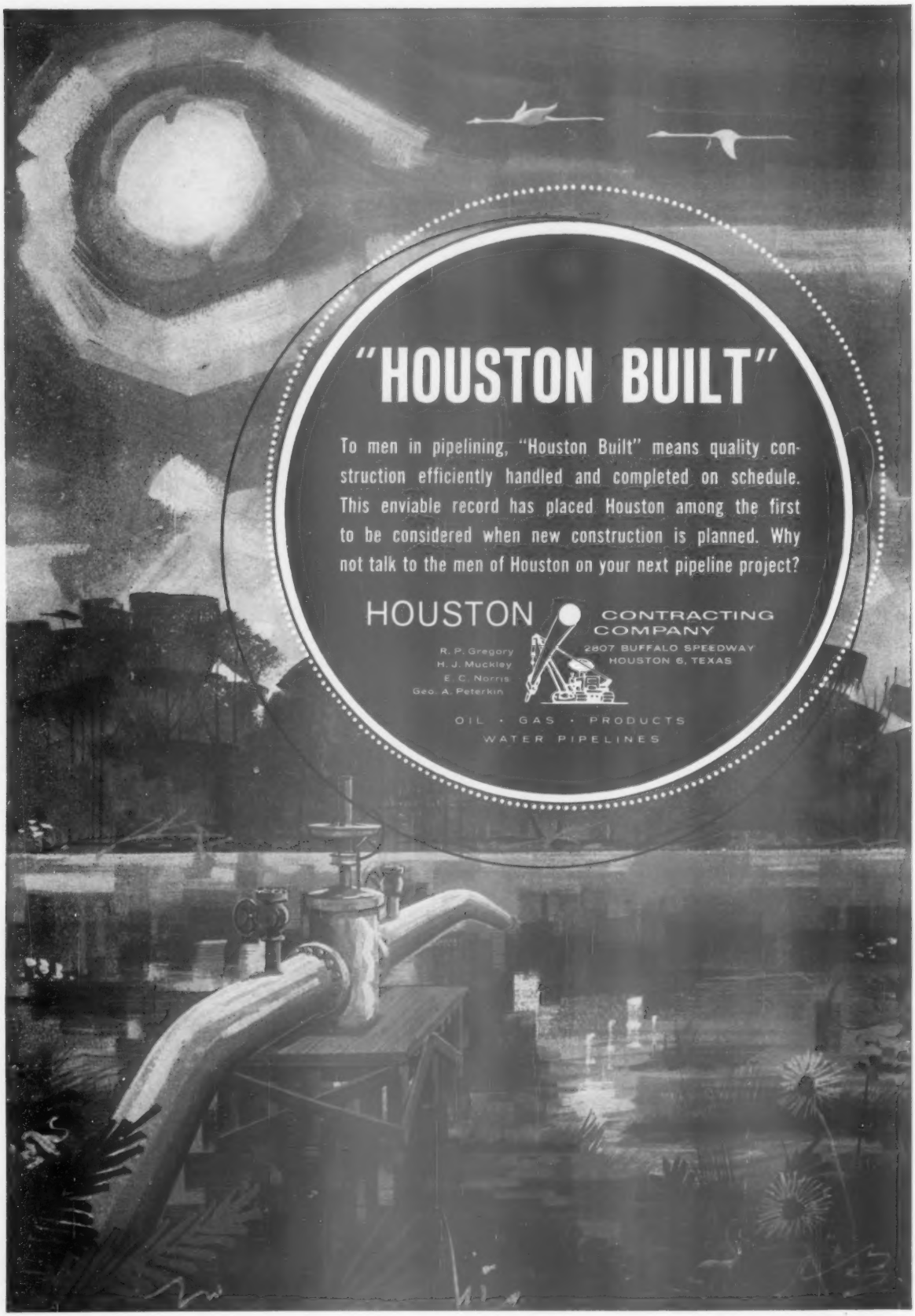
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PIPELINE CONSTRUCTION

and 67 miles of 12-in. from Duluth to Silver Bay, Minn.
Status: Approved by FPC.
Completion: 1960.

LONE STAR GAS CO., 301 S. Harwood, Dallas, Tex.
Project: 48-mile 20-in. line from Springtown to Irving, Tex.
Status: Under way.
Completion: September 1960.

LO-VACA GATHERING CO. (subsidiary of Coastal States Gas Producing Co., 200 Petroleum Tower, Corpus Christi, Tex.).
Project: 230 miles of 6 to 20-in. line from Live Oak County to Lavaca County, Texas.
Status: Pending FPC approval.
Completion: Late 1960 or early 1961.

MANUFACTURERS LIGHT & HEAT CO., Union Trust Building, Pittsburgh 19, Pa.
Project: 70 miles of 20-in. from Sideling Hill Mountain to Abbottstown, Pa.
Status: Under way.
Contractor: Williams Brothers Co., Tulsa, Okla.
Completion: September 1960.
Project: 33 miles of 20-in. from Point Marion to Route 40 near Addison, Pa.
Completion: September 1960.
Project: About 8 miles of 4 to 16-in. line in the Victory storage area, West Virginia.
Completion: September 1960.

MICHIGAN WISCONSIN PIPE LINE CO., 500 Griswold Street, Detroit 26, Mich.
Project: 342½ miles of 24-in. and 192 miles of 30-in. main-line loops.
Status: Pending FPC approval.
Contractors: R. H. Fulton & Co., Lubbock, Tex.; Bechtel Corp., San Francisco; Majestic Contractors, Inc., Houston; and Somerville Construction Co., Ada, Mich.
Completion: November 1, 1960.
Project: 92 miles of 24-in. from Appleton to Marshfield, Wis.
Status: Under way.
Contractor: Houston Contracting Co.
Completion: October 1, 1960.
Project: 85 miles of 16-in. from Weyauwega to Marinette, Wis.
Status: Under way.
Contractor: Hallmac Construction Co., Houston.
Project: 111 miles of various 4 to 8-in. laterals in Wisconsin.
Status: Under way.
Contractor: Panama-Williams Corp., Houston.
Completion: October 1, 1960.

(Continued on page 233)

STOP H_2S CORROSION BEFORE IT STARTS!

• The Connelly IRON SPONGE purification process at the well site removes hydrogen sulphide BEFORE the gas is piped to central processing. Thus, the cause of pipe line corrosion is eliminated because corrosive gas never enters the transmission lines. Additionally, Connelly IRON SPONGE eliminates the need for extreme close control. It operates with high efficiency at low or high pressures—absorbs more H_2S, gives longer service between foulings and is easily regenerated. If you have a purification problem check this MOST ECONOMICAL solution today. Write for Field Processing Bulletin #OG-7.

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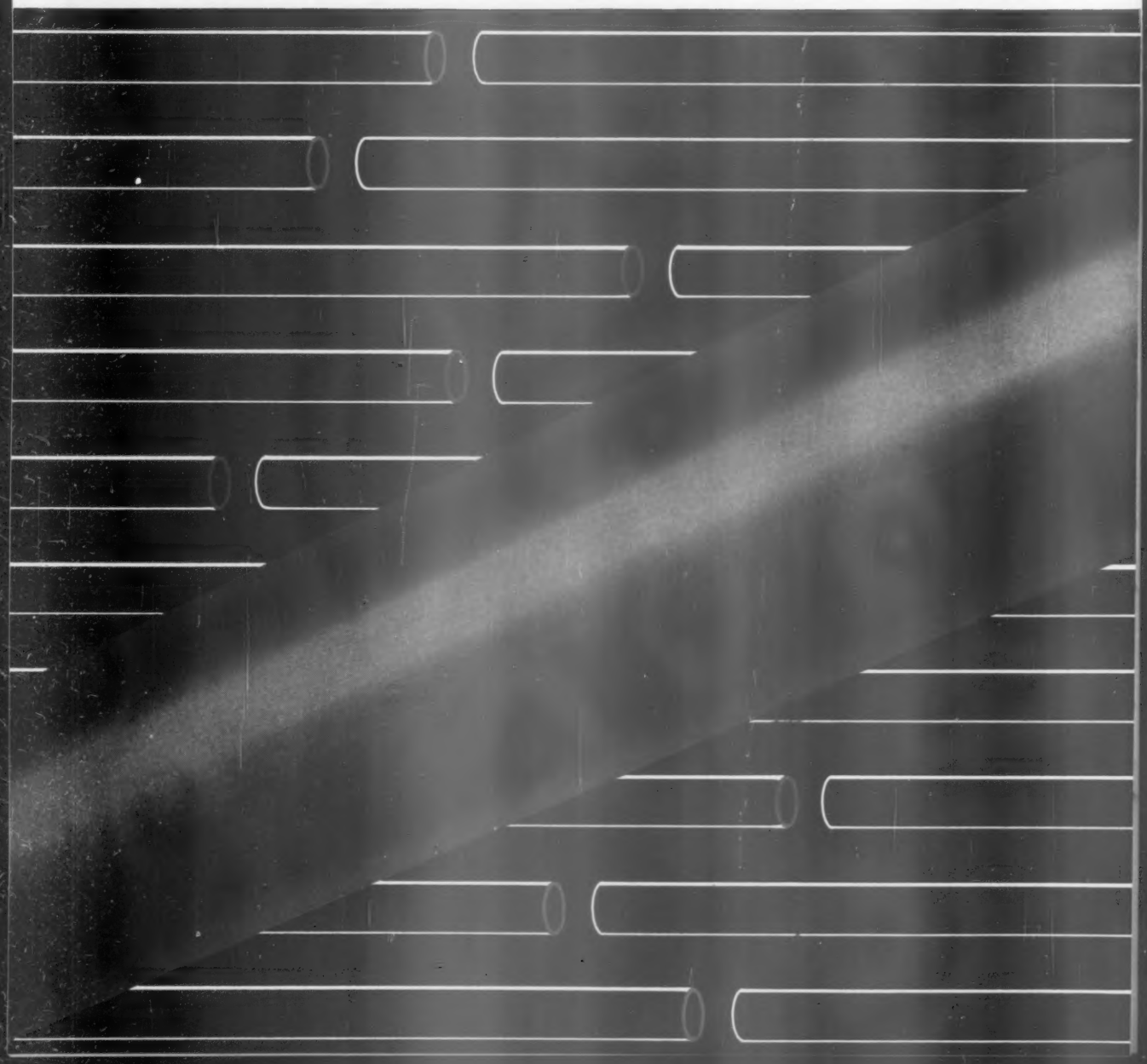

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YOU SAVE UP TO 1/3 THE COST!

Republic has it—light wall electric weld that is ideal for low pressure gathering and distribution applications. Manufactured to applicable parts of API Specification 5L, Republic Light Wall saves you up to ⅓ the weight, ⅓ the cost.

Light wall pipe is joined by welding or with light wall pipe fittings. Or, pipe may be grooved for Victaulic Couplings. Republic X-TRU-COAT is supplied in all sizes of light wall pipe. Provides an ideal combination of the strength of steel and the protection of plastic.

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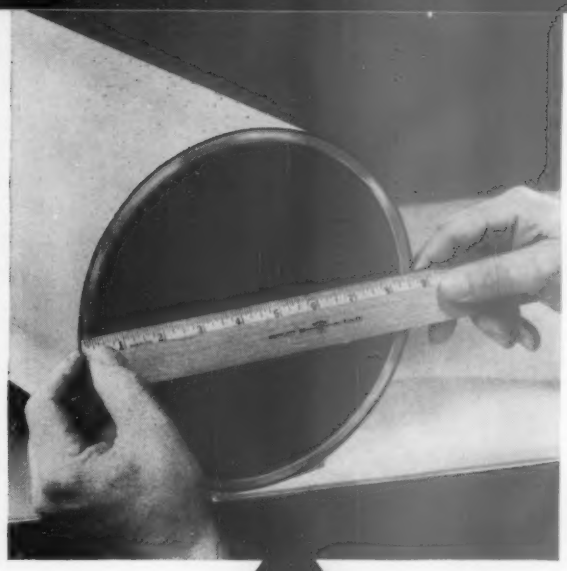
REPUBLIC STEEL

Electric Weld • Seamless • Fusion Weld • Continuous Butt Weld
Light Wall • X-TRU-COAT • Plastic Pipe



X-TRU-COAT THROUGH 8⅝" O.D.

Proven corrosion-resistance for more big jobs comes with Republic's announcement of 6⅝" O.D. and 8⅝" O.D. X-TRU-COAT. This is the polyethylene coated line pipe that stops chemical and electrolytic corrosion. This is the *factory-coated* pipe that is more resistant to shipping, stringing, and backfilling damage. New X-TRU-TAPE Joint Wrap and X-TRU-PRIMER are also available. Mail the coupon for details.

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Republic alloy steel studs and hex nuts for high temperature service have accurate, full formed threads. Nuts can be pulled up tight yet backed off quickly. The proper choice of steels, plus precisely controlled heat treatment reduces the usual dangers of creep, stretch, or fatigue failures to an absolute minimum. Studs normally supplied in AISI 4140 Chrome-Moly Steel, heat treated to ASTM A193, designation B-7, or in designations B-14 and B-16. Send for booklet listing types, sizes, and specifications.

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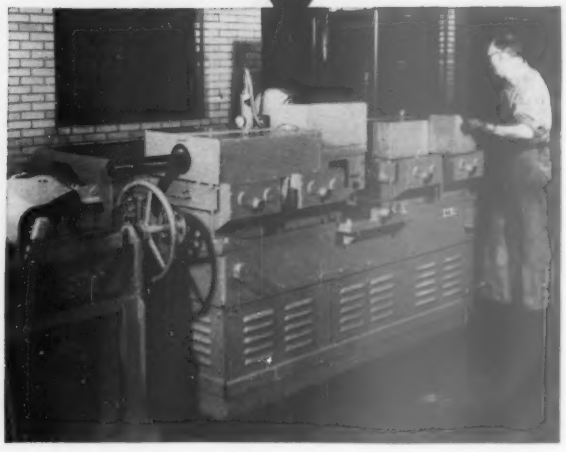

FARROWTESTED HEAT EXCHANGER TUBING

With Republic ELECTRUNITE® Heat Exchanger Tubing, FARROWTEST® non-destructive testing is offered as an alternate to other less positive tests at no extra cost. FARROWTEST is an electronic method of searching out and rejecting defects of critical size. ELECTRUNITE Heat Exchanger Tubing is formed from highest quality flat rolled steel—carbon or stainless—and welded without the addition of foreign metal. Return the coupon for complete information.

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REPUBLIC STEEL

World's Widest Range of Standard Steels and Steel Products

PIPELINE CONSTRUCTION

Project: 31 miles of various 4 to 6-in. laterals in Wisconsin.
Status: Under way.
Contractor: R. H. Fulton & Co., Lubbock, Tex.
Completion: October 1, 1960.
Project: 41 miles of various 4 to 6-in. laterals in Iowa and Missouri.
Status: Approved by FPC.
Completion: September 1, 1960.

MIDWESTERN GAS TRANSMISSION CO., Houston.
Project: 504 miles of 24-in. from Emerson, Man., to Marshfield, Wis., plus 54 miles of sales laterals.
Completion: November 1, 1960.
Status: Under way.
Contractors: Bechtel Corp., 155 miles from Canadian border to Becker-Clay county line in Minnesota; Grayco Constructors, Inc., 54 miles from Becker-Clay county line to near New York Mills, Minn.; H. G. Price Co., 56 miles from New York Mills to Mississippi River; Houston Contracting Co., 109 miles from Mississippi River to Wanderoos, Wis.; Contracting & Material Co., 54 miles from Wanderoos to Chippewa River; Panama, Inc., 66 miles from Chippewa River to Marshfield, Wis.; Texas Pipeline Construction, Inc., 16 miles of laterals; and Bristow-Hyde Engineering Corp., 39 miles of laterals.
Completion: By November 1, 1960.

MISSISSIPPI RIVER FUEL CORP., 407 North 8th Street, St. Louis 1, Mo.
Project: 5 miles of 16-in. and 15 miles of 12-in. from Collinsville, Ill., to St. Jacob, Ill.
Status: Pending FPC approval.

MISSISSIPPI RIVER TRANSMISSION CORP. (Mississippi River Fuel Corp.), St. Louis.
Project: 94 miles of 18-in. from Johnsonville, Ill., to the St. Louis area.
Status: Pending FPC approval.
Project: 115 miles of 24-in. from near Oran in Southeast Missouri to St. Louis County.
Status: Planned.
Completion: Last half 1960.

MONTANA-DAKOTA UTILITIES CO., 831 Second Ave., S., Minneapolis.
★ Project: 16 miles of 12-in. from Bridger to Fromberg, Mont.
Contractor: Sterling Construction Co., Sterling, Colo.
Completion: September 30, 1960.

MOUNTAIN FUEL SUPPLY CO., 180 East 1st South Street, Salt Lake City.
Project: 20 miles of 20-in. from Piedmont to Yellow Creek.
Completion: October 9, 1960.
Project: 7 miles of 24-in. from Mountain Dell to Salt Lake City.
Contractor: Pease Brothers Co., Vernal, Utah.
Completion: August 8, 1960.
Project: 6 miles of 20-in. from Kanda Junction to Green River, Wyo.
Completion: August 8, 1960.

MUSTANG FUEL CORP., affiliate of Oklahoma Resources Development Co., Cameron Building, Oklahoma City.
Project: About 170 miles of 12-in. trunk line from Oklahoma City to Harrah and Muskogee, Okla., and about 130 miles of 4 to 12-in. lateral in Central Oklahoma.
Contractors: Sadler Brothers Pipeline Construction Co. and Montin-Harbert Pipe Line Construction Co., both of Oklahoma City.
Completion: Fall 1960.

NATURAL GAS GATHERING CO., INC., Corrigan Tower, Dallas, and **GULF RESOURCES, INC.**
Project: 31 miles of 10, 12, and 14-in. in Zapata and Starr counties, Texas.
Status: Pending FPC approval.
Completion: Fall 1960.

NATURAL GAS PIPELINE CO. OF AMERICA, 122 South Michigan Avenue, Chicago.
Project: 188 miles of 24 and 139 miles of 36-in. loops in Oklahoma, Kansas, and Iowa.
Status: Approved by FPC.
Contractors: River Construction Corp., Fort Worth, Tex.; O. R. Burden Construction Corp., Tulsa, Okla.; and R. H. Fulton & Co., Lubbock, Tex.
Completion: Fall 1960.

Project: 12 miles of 3, 4, and 6-in. gathering system in Wise County, Texas.
Status: Under way.
Project: 5 miles of 8-in. Chitwood lateral line in Grady County, Oklahoma.
Status: Pending FPC approval.
Project: 18 miles of 4 to 10-in. Smith-Collins gathering system in Carson County, Texas.
Status: Pending FPC approval.

NIAGARA MOHAWK POWER CORP., Syracuse, N. Y.
Project: 104 miles of 12-in. from Watertown, N. Y., to Massena, N. Y.
Status: Planned.
Completion: November 1960.
Project: 22 miles of 6-in. from Massena to Malone, N. Y.
Completion: November 1960.
Project: 17 miles of 6-in. from Watertown to Carthage, N. Y.
Completion: September 1960.

NORTHERN ILLINOIS GAS CO., 50 Fox

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PIPELINE SYSTEMS
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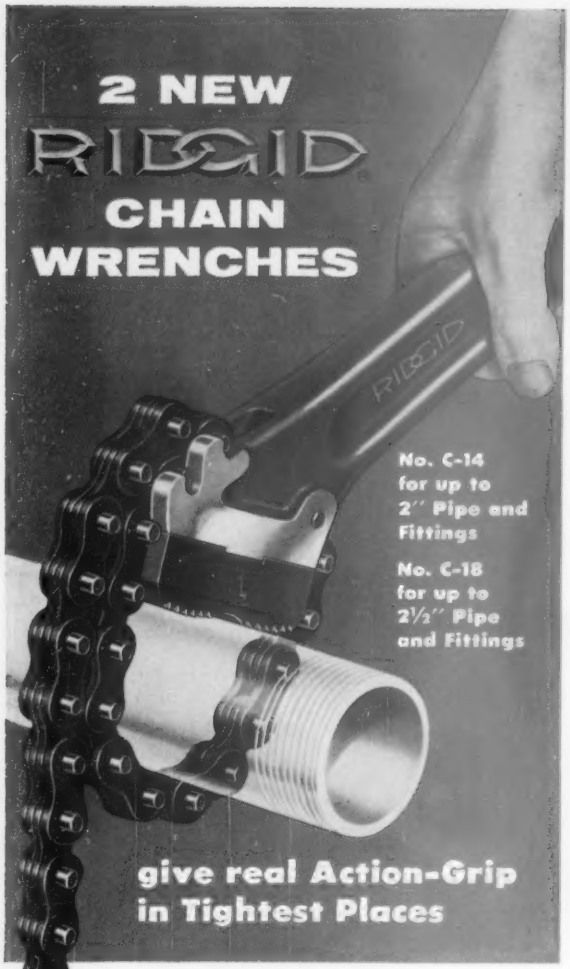

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PIPELINE CONSTRUCTION

Street, Aurora, Ill.
Project: 75 miles of 30-in. from Troy Grove storage field to LaGrange, Ill.
Status: Under way.
Contractor: Contracting & Material Co., Evanston, Ill.
Completion: Early fall 1960.

NORTHERN NATURAL GAS CO., Omaha.
Project: 217 miles of main line, 221 miles of main-line loops, and 2,178 miles of branch lines of various diameters.
Completion: 900 miles were completed in 1959.
★ Project: 41 miles of varying diameter gathering lines in Ochiltree and Hansford counties, Texas.
Status: Pending FPC approval.
Project: About 21 miles of 16-in. and 26 miles of various small diameter pipeline in the Glick field, Kansas, area.
Status: Pending FPC approval.
Project: 188 miles of 24-in. and 215 miles of 30-in. from Farmington, Minn., to International border.
Status: Proposed.
Project: 83 miles of 20-in. from East Dubuque, Ill., to Janesville, Wis.
Status: Pending FPC.
Completion: Fall 1960.

OHIO FUEL GAS CO., 99 North Front Street, Columbus 15, Ohio.
Projects: About 28 miles of 5 to 20-in. line in various places in Ohio.
Completion: Summer and fall 1960.

OLD OCEAN FUEL CO. (subsidiary of Texas Electric Service Co.). Fort Worth.
Project: 364 miles of 16, 20, and 24-in. from the Gulf Coast south of Houston to the Fort Worth area.
Status: Under way.
Contractors: H. B. Zachry Co., San Antonio, Tex., and O. R. Burden Construction Corp., Tulsa, Okla.
Completion: December 1960.

PACIFIC GAS & ELECTRIC CO., San Francisco.
Project: 9 miles of 12-in. from Berenda Creek to Chowchilla, Calif.
Status: Planned.
Contractor: Company crews.
Completion: 1960.
Project: 8 miles of 16 and 2 miles of 10-in. Fresno reinforcement.
Status: Planned.
Contractor: Company crews.
Completion: 1960.
Project: 7 miles of 16-in. from Ignacio to Petaluma, Calif.
Status: Planned.
Contractor: Company crews.
Completion: 1960.
Project: 67 miles of line from Kettleman Hills to Morro Bay, Calif.
Project: 120 miles of 34-in. looping of Topock-Milpitas main line.
Status: Planned. Pending FPC approval.
Completion: 1961.
Project: 11 miles of 20-in. from Pittsburg to Walnut Creek, Calif.
Contractor: Using company crews.
Completion: 1960.
Project: 296 miles of 36-in. from the California-Oregon border to Antioch, Calif.
Status: Pending state approvals.
Completion: 90 miles scheduled for completion in 1960, the rest in 1961.

PACIFIC GAS TRANSMISSION CO. (Pacific Gas & Electric, San Francisco).
Project: 614 miles of 36-in. from Kingsgate, B. C., to California border near Klammath Falls, Ore.
Status: Has FPC examiner's approval.

PANHANDLE EASTERN PIPE LINE CO., 1221 Baltimore Avenue, Kansas City, Mo.
Project: 50 miles of 22-in. and 150 miles of 24-in. from Haven, Kans., to Elk City, Okla.
Status: Pending FPC approval.
Completion: December 31, 1960.
Project: 300 miles of 30-in., 18 miles of 26-in., 9 miles of 12-in., 29 miles of 8-in., and 40 miles of 6-in. loop.
Status: Pending FPC approval.
Completion: December 31, 1960.
Project: 141 miles of 4 to 16-in. gathering line.
Contractor: Hall Construction Co., Liberal, Kans.
Completion: December 31, 1960.

PEOPLES GAS LIGHT & COKE CO., 122 South Michigan Avenue, Chicago 3, Ill.
Project: 29 miles of 36-in. in the Chicago area.
Status: One portion under way.
Completion: 1960-62.

PEOPLES GULF COAST NATURAL GAS PIPELINE CO., 122 South Michigan Avenue, Chicago 3, Ill.
Project: 371 miles of 30-in. loop of present system between Texas and Chicago.
Status: Approved by FPC.
Contractors: Stanley-Bledsoe Corp.; O. R. Burden, Tulsa, Okla.; H. C. Price Co., Bartlesville, Okla.; River Construction Corp., Fort Worth, Tex.; Panama-Williams Corp., Houston; and Sharman, Allen, Gay & Taylor, Inc., Houston.
Completion: November 15, 1960.
Project: About 59 miles of various size looping of main line in Texas.
Completion: October 12, 1960.

PEOPLES NATURAL GAS CO., Two Gateway Center, Pittsburgh 22, Pa.
Projects: About 23 miles of 12 and 20-in. line in various parts of Pennsylvania.

THE C-R-C PIPE SLING

- **SAFE:** Sling has no humps or projections to dig into surface of coated pipe.
- **THIN:** Only 5/8" thick. Ideally suited for narrow ditches.
- **STRONG:** Tested lifting capacity of C-R-C Pipe Sling* — up to 216,000 lbs.
- **FLEXIBLE:** Strong, steel-wire links enclosed in heavy-duty rubber give this husky sling flexible strength.
- **UNFASTENS EASILY:** Especially designed sling iron permits quick — easy, fastening and unfastening after pipe is in the ground.

* *Patent applied for.*

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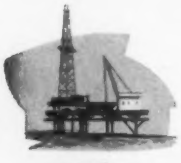
In order to provide complete corrosion protection, the Amercoat Corporation manufactures more than 40 completely different products, each formulated to give maximum corrosion protection for specific applications. As new processes and techniques alter exposures and requirements, Amercoat's continuing research develops new products to meet those requirements. Also, advanced research and testing upgrades and improves existing products to maintain maximum protection and enduring, maintenance-free life. Amercoat protective coatings, ranging from vinyls to epoxies to phenolics, are tailor-made for long-range protection and economy in tough applications.



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PIPELINE CONSTRUCTION

Contractors: Joyce Western Corp., R. C. Ernst, and Laurel Ridge Construction Co., have contracts on some of the line.
Completion: August through October 1960.

PHILLIPS PETROLEUM CO., Bartlesville.
Project: 85 miles of 2 to 16-in. gathering lines in Eddy County, New Mexico.
Status: Under way.
Contractor: McVean & Barlow.
Completion: September 1960.

PIONEER NATURAL GAS CO., Amarillo.
Project: 21 miles of 12-in. from Sudan to Muleshoe, Tex.
Status: Pending FPC approval.
Project: 12 miles of 10-in. from Muleshoe, Tex. northward.
Status: Pending FPC approval.

PUBLIC SERVICE CO. OF NORTH CAROLINA, Gastonia, N. C.
Project: About 47 miles of 4, 8, and 10-in. in North Carolina.

RIO GRANDE VALLEY GAS CO., Box 391, Brownsville, Tex.
Project: 60 miles of 12-in. in Hidalgo, Starr, and Jim Hogg counties from Moore field area to Prado field area, replacing and reconditioning existing line.
Status: Planned.
Completion: 1961.
Project: 5 miles of 6-in. from Moore field area to North Monte Christe field, Hidalgo County.
Status: Planned.
Contractor: Own forces.
Completion: December 1960.
Project: 3½ miles of 12-in. in South Weslaco field area, Hidalgo County.
Status: Planned.
Contractor: Own forces.
Completion: December 1960.

ROCKY MOUNTAIN NATURAL GAS CO.
Project: 65 miles of gas line in southwestern Colorado to supply Collbran, Montrose, Delta, and Orchard City.
Status: Planned.

SOUTH TEXAS NATURAL GAS GATHERING CO. (subsidiary of Coastal States Gas Producing Co., 200 Petroleum Tower, Corpus Christi, Tex.).
Project: 30 miles of 12-in. from south Jim Wells County to the May field area in Kleburg County, Texas.
Status: Pending FPC approval.
Completion: September 1960.
Project: 40 miles of 4 to 14-in. line in northwest Jim Hogg County to south Zapata County, Texas.
Status: Planned.
Completion: Late 1960 or early 1961.

SOUTHERN CALIFORNIA GAS CO., Los Angeles.
Project: 13 miles of 34-in. from San Fernando Valley to West Los Angeles.
Status: Approved.
Completion: 1960.

SOUTHERN CALIFORNIA GAS CO., and **SOUTHERN COUNTIES GAS CO. OF CALIFORNIA,** Los Angeles.
Project: 93 miles of 34-in. from Ivanpah to Newberry, Calif.
Status: Pending FPC approval.
Completion: 1961.
Project: 115 miles of 36-in. from Newberry to Placentia, Calif.
Status: Under way.
Contractors: Young & Anderson Co., Brea, Calif., has contract for 85 miles from Newberry to Fontana. Contractors for the remainder are Hood Construction Co., Whittier, Calif.; J. P. Neill & Co., Dallas; and River Construction Corp., Fort Worth, Tex.
Completion: August 1960.

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Heat drain reduces internal temperature of unit up to 40%, providing longer component life (case has wrap-around heat sink). Standby monitoring feature cuts battery drain to a mere 2¼ amps. With vehicle engine off, radio can be left on to receive incoming messages for long periods without impairing battery life—automotive cabling used exclusively for greater flexibility, positive contact, corrosion resistance. Five watts of audio power for greatest message intelligibility. Equipment easily moved from car-to-car—trunk or true-dash mount. Security sealed circuits clearly numbered to provide "road map" for fast, simple servicing—RCA Service Company technicians available to keep your equipment operating at maximum efficiency.

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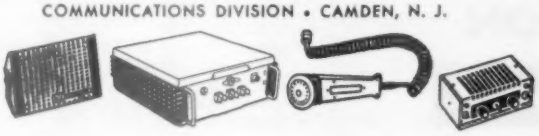

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BANK

PIPELINE CONSTRUCTION

ST. LAWRENCE GAS CO., Ogdensburg, N. Y.
Project: 75 miles of line from Cornwall, Ont., to Ogdensburg, N. Y.
Status: Pending FPC approval.

TENNESSEE GAS PIPELINE CO., a division of Tennessee Gas Transmission Co., Box 2511, Houston 1, Tex.
Project: 21 miles of 16-in. gathering line from Louisiana coast to Block 46 in the Vermilion area.
Status: Pending FPC approval.
Project: 2 miles of 12-in. gathering line from Block 66 to Block 64, East Cameron area, offshore Louisiana.
Status: Pending FPC approval.
Project: 158 miles of 36-in. loop lines at various points between Kinder, La., and Centerville, Tenn.
Status: Approved by FPC.
Project: 11½ miles of 16-in., 44 miles of 12-in., and 10 miles of 10-in. off Louisiana coast.
Status: Pending FPC approval.
Project: 12 miles of 12-in. gathering line from Louisiana coast to Block 17, East Cameron area, offshore Louisiana.
Status: Approved by FPC.
Project: 191 miles of 30 and 36-in. loop at various points in Ohio, Pennsylvania, and New York.
Status: Pending FPC approval.

TEXAS EASTERN TRANSMISSION CORP., Shreveport, La.
Project: 85 miles of 24-in. from Tamarack, to Perulack, Pa.
Status: Pending FPC approval.
Project: 40 miles of 36-in. from Lambertville, to Linden, N. J.
Status: Pending FPC approval.
Project: 23 miles of 20-in. from Eagle, to Chester Junction, Pa.
Status: Pending FPC approval.
Project: 53 miles of 30-in. from Perulack, Pa., to Lambertville, N. J.
Contractors: Contracts for the above Texas Eastern projects are held by H. C. Price Co., Bartlesville, Okla.; Western Pipe Line, Inc., Austin, Tex.; and Sharman, Allen, Gay & Taylor, Inc., Houston. Completion in 1960.
★ Project: 66 miles of 30-in. loop, mostly in Louisiana and Mississippi, with some in Ohio, Pennsylvania, and New Jersey.
Status: Pending FPC approval.
Completion: Before the 1960 heating season.

TEXAS GAS TRANSMISSION CORP., Box 577, Owensboro, Ky.
Project: 29 miles of 12-in. from Slaughters to proposed storage at Greenville, Ky.
Status: Planned.
Project: 24 miles of 30-in. south of Bastrop, La., and 56 miles of 12-in. loop in Indiana.
Completion: Fall 1960.

TRANSCONTINENTAL GAS PIPE LINE CORP., 3100 Travis St., Houston, Tex.
Project: 23 miles of 20-in. offshore Louisiana.
Status: Under way.
Contractor: Brown & Root, Inc., Houston.
Completion: 1960.
Project: 73 miles of 8 to 16-in. offshore Louisiana.
Status: Approved by FPC.
Completion: 1960.
Project: 14 miles of 20-in. in New Jersey and Pennsylvania.
Status: Approved by FPC.
Completion: 1960.
Projects: 7 miles of 16-in., 69 miles of 30-in., and 269 miles of 36-in. in various states.
Status: Pending FPC approval.
Completion: 1960.

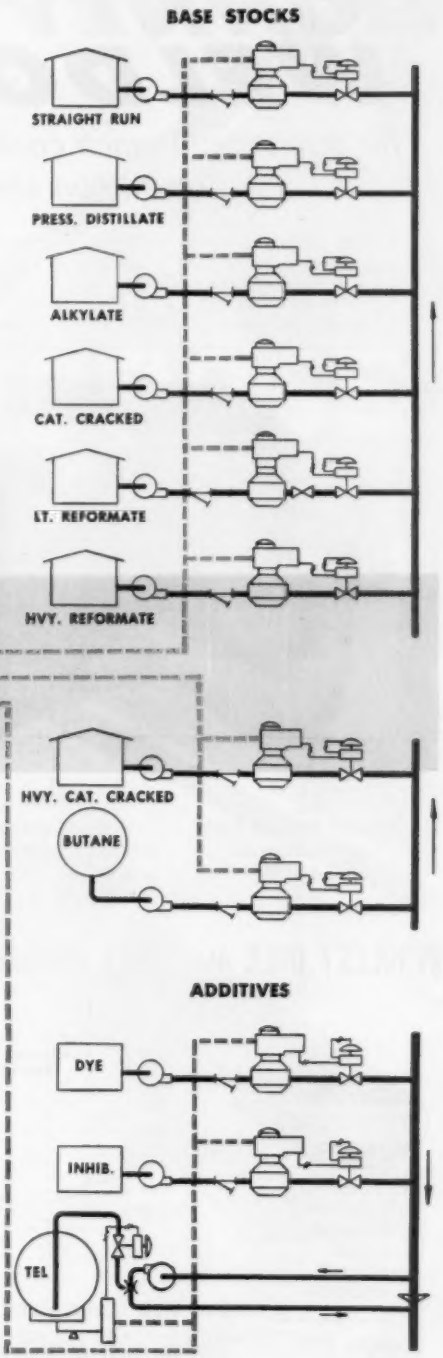
POSITIVE CONTROL OF *MATERIALS IN MOTION* BIF METERS FEEDERS CONTROLS

ON STREAM!

B-I-F ELECTRONIC BLENDING SYSTEMS

NOW... *Proportioneers*

reliable multicomponent blenders
. . . eliminate costly distance factor!
. . . achieve maximum efficiency in less space!



Faster! More accurate! More compact! Many features added to "performance proved-leading element" blending system as first electronically controlled blender goes "on stream!"

- Digital control combined with instantaneous response sets new highs in specification accuracies.
- High level signals . . . not influenced by local disturbances . . . allow use of single conduit for added installation savings.
- Compact control console can be located at most convenient spot *away* from blend manifold.
- Exclusive interchangeable modular construction increases flexibility . . . cuts maintenance . . . facilitates servicing.
- Preformulation "dry run" tests save product.
- Electronic field service eliminated with single replaceable module.
- Only electronic blender with memory feature.
- Automatic setting — statically from punched data cards — dynamically from customers computer center.

Dependable Proportioneers stream blending systems are producing blends from base stocks throughout the world without intermediate tankage, cutting investment and operating costs, increasing production. The new electronic console makes this proven system even better!

B-I-F *Industries*

BUILDERS-PROVIDENCE • PROPORTIONEERS • OMEGA

METERS • FEEDERS • CONTROLS / CONTINUOUS PROCESS ENGINEERING

Write for complete data.
B-I-F Industries, Inc., Dept. P.,
377 Harris Avenue, Providence 1, Rhode Island

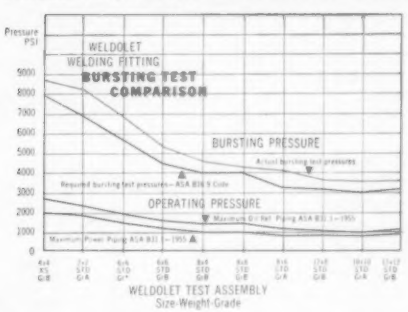
new redesigned BONNEY WELDOLETS

for reinforced branch connections on carbon steel and alloy pipe

Welding fittings manufactured and tested in accordance with ASA B16.9 and ASA B31.1

clean-cut bevel with exactly 1/16" land
bore machined with a watchmaker's precision and finish
reduced angle of bevel ... weld volume cut almost 50%
weld line clearly defined ... no more errors about "how much to weld"
skirt taper redesigned for improved stress distribution

RESULTS? OVER 4½ TIMES MAXIMUM OPERATING PRESSURE



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WELDOLETS®
THREDOLETS®
SOCKOLETS®
ELBOLETS®
BRAZOLETS®
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CARBON STEEL
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ALLOY
for all services

For high strength and low-total installed cost compare with . . . other reinforced branch construction . . . unreinforced branch construction . . . and welding tee construction. Then specify and use Weldolet fittings for all full size and reducing branch connections.

BONNEY FORGE AND TOOL WORKS

ALLENTOWN, PENNSYLVANIA

PIPELINE CONSTRUCTION

TRANSOK PIPE LINE CO., First National Building, Tulsa, Okla.
★ Project: 47 miles of 24-in. from Creek County to new power plant at Oologah in Rogers County, Oklahoma.
Status: Planned.

TRUNKLINE GAS CO., Box 1642, Houston.
Project: 31 miles of 30-in. from Longville to Pitkin, La.; 58 miles of 30-in. from Riverton to Kilbourne, La.; 63 miles of 30-in. from Ballentine, Miss., to Canadaville, Tenn.; 65 miles of 30-in. from Bardwell, Ky., to Marion, Ill.; and 35 miles of 30-in. from Neoga to Bourbon, Ill.
Contractor: Stanley-Bledsoe Corp., Tulsa, has double-jointing contract for 78 miles in Mississippi, Tennessee, and Louisiana.
Project: 140 miles of supply lateral in South Louisiana, including a 17-mile 24-in. loop of an existing lateral and 123 miles of 20, 24, and 26-in.
Status: Pending FPC approval.
Completion: Fall 1960.
Project: 177 miles of 30-in. loops in Louisiana, Arkansas, Mississippi, Tennessee, and Kentucky.
Status: Under way.
Contractor: Panama, Inc., Houston.
Project: 62 miles of 26-in. extension from Bourbon to Rossville, Ill.
Status: Under way.
Contractor: Contracting & Material Co., Evanston, Ill.

UNION HILL STORAGE CO., 122 S. Michigan Ave., Chicago 3, Ill.
Project: 7½ miles of 12-in. in Mahomet field pilot system, Illinois.
Completion: August 12, 1960.

UNITED GAS PIPE LINE CO., Box 1407, Shreveport 92, La.
Project: 59 miles of 36-in. purchase lateral connecting Bastian Bay field, Louisiana.
Status: Pending FPC approval.
Completion: Fall 1961.

WESTERN SLOPE GAS CO., 900 Fifteenth St., Denver 2, Colo.
★ Project: 6 miles of 6-in. from Palisade to Cameo, Colo.
Status: Planned.
Completion: October 1, 1960.

Canadian Crude Oil Pipelines

ACT OILS, LTD.
Project: A 450-mile line from the Peace River region to tidewater at Kitimat, B. C.
Status: Proposed.

BITUMINOUS OIL PIPELINE CO. (Royalite Oil Co., and Can-Amera Oilsands Development, Ltd.)
Project: A 250-mile line from Athabasca oil sands to Edmonton.
Status: Proposed.

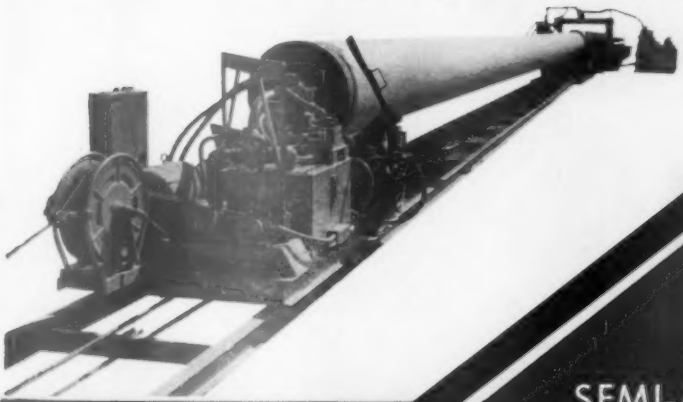
FEDERATED PIPE LINES, LTD., 304 Sixth Ave., SW., Calgary, Alta.
Project: 14 miles of 6-in. and 18 miles of 8-in. in Swan Hills area, Alberta, and 41½ miles of line from Oliver to Highbridge, Alta.
Status: Under way.
Contractor: Majestic Contractors, Ltd., Edmonton.

INDEPENDENT PIPE LINE CO. (Home Oil Co.), Calgary.
Project: 1,073 miles of 36-in. from Edmonton, Alta., to Superior, Wis.; 946 miles of 34-in. from Superior to Montreal, Que.; 72 miles of 16-in. and 74 miles of 10-in. feeder lines from Calgary to Bellshill Lake, Alta.
Status: Proposed.

MATADOR PIPE LINE CORP., Denver.

NOW YOU CAN COAT AND WRAP PIPE EASIER—

FASTER — and at greatly reduced cost . . .



WITH THE NEW

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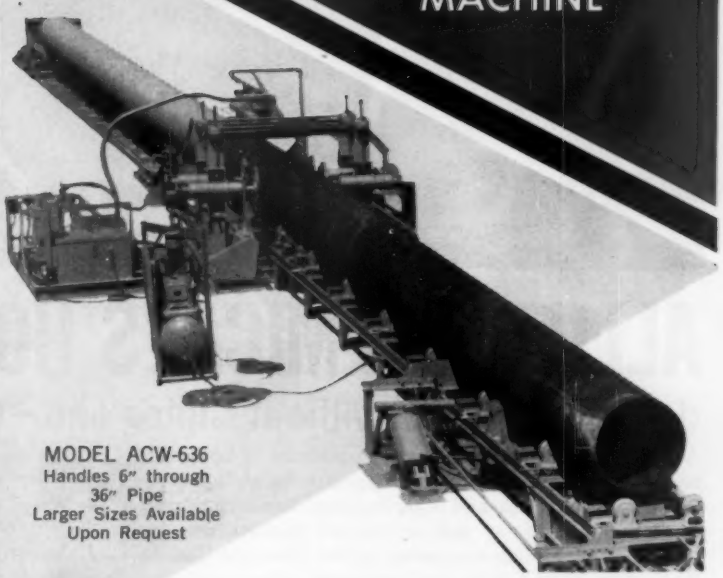
SEMI-AUTOMATIC
STATIONARY COATING
& WRAPPING
MACHINE



MODEL ACW-636
Handles 6" through
36" Pipe
Larger Sizes Available
Upon Request

COMPLETELY ELIMINATES PIPE COUPLERS (Come-Alongs)

- Cuts Operation Costs — Requires Only Five-Man Crew
- Designed for Continuous Heavy Duty Service
- Handles Larger Pipe Sizes Easier
- Quickly Adjustable to Different Pipe Sizes
- Automatic Feed-In Mechanism with Powered Input Conveyor
- Handles Crooked or Out-of-Round Pipe
- Hydraulic Powered

For complete details on how you can greatly reduce pipe coating and wrapping costs, write today for full information on the new Crose Semi-Automatic Stationary Coating and Wrapping Machine.

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EQUIPMENT CORP.

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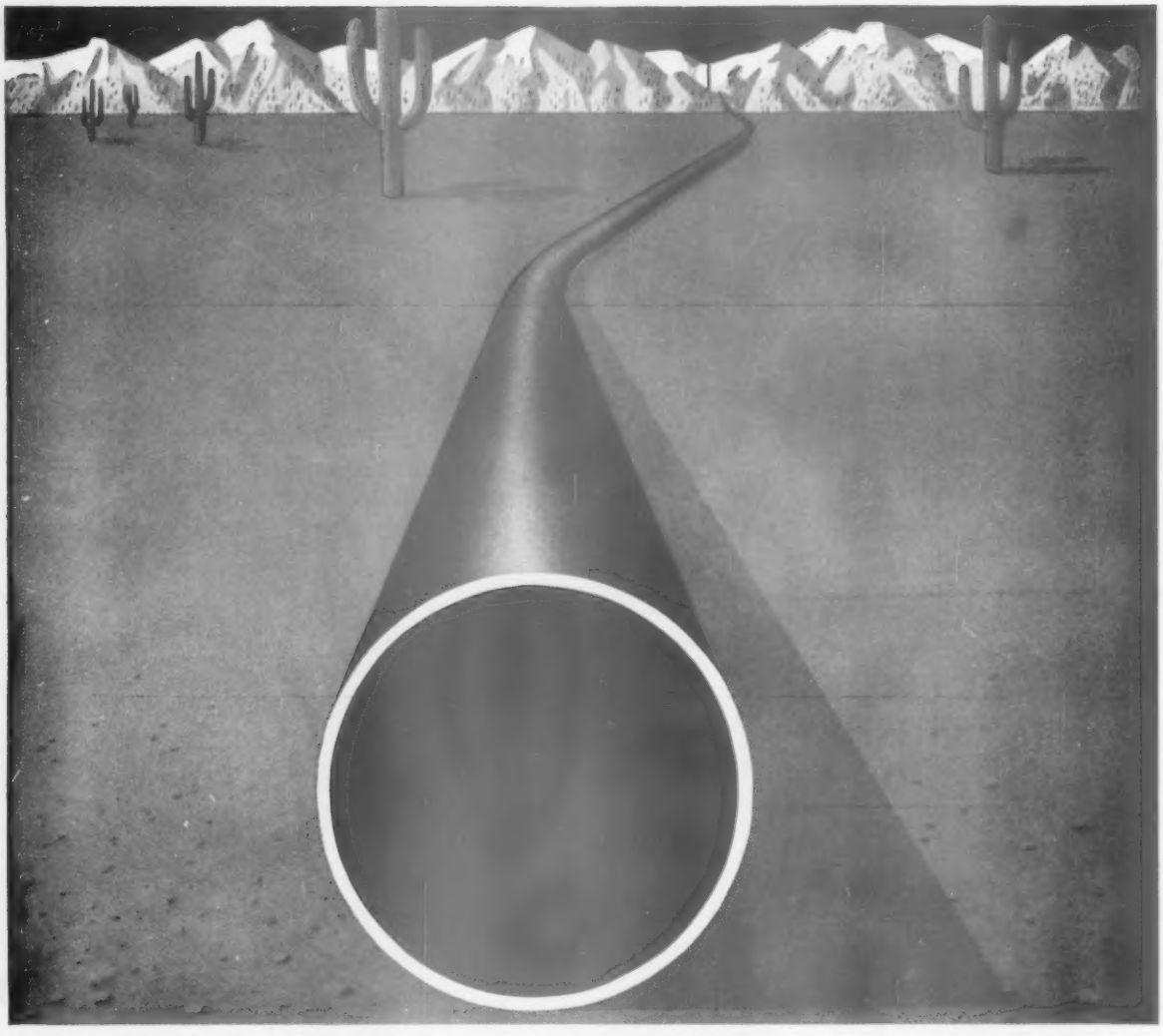

ALLIED CHEMICAL'S HOTLINE ENAMEL

defies 180°F. heat without sliding and −10°F. cold without cracking

Allied Chemical Hotline Enamel's resistance to both high and low temperatures, as well as its greater durability, compared to asphalt base and other coatings, has been proved by laboratory tests, and on-the-job performance for leading public utility companies. Allied Chemical Hotline Enamel is derived from coal-tar pitch, thus possessing inherent protective properties against the damaging effects of water, soil chemicals and electrical currents.

Improves protection under these specific conditions:

1. On pipe-type cables or "oil-o-static lines" which are subject to internal electrical heat from high-voltage surges.

2. Hot gas pipelines, on discharge side of compressor stations where line is above 120°F.

3. Warm, swampy areas or other places where excessive soil stress is encountered.

4. Areas where backfill and trenches are rough, rocky or contain objects which normally penetrate softer coatings.

5. Pipelines (such as heated fuel lines) where temperatures are constantly high most of the time, but do not exceed 180°F. or 200°F. for short term exposure.

A staff of field service experts are at your call to offer you technical assistance that can save you maintenance time and costs. **LAST WORD IN CORROSION PROTECTION.**

PLASTICS AND COAL CHEMICALS DIVISION
40 Rector Street, New York 6, N. Y.

Allied Chemical

PIPELINE CONSTRUCTION

Project: 175-mile line from Burke, Bottineau, and Renville counties, North Dakota, to Cromer, Man.
Status: Proposed. (See U. S.)

MID-CONTINENT PIPE LINES, LTD., Edmonton, Alta.
Project: 1,500 miles of 30-in. from Edmonton to Chicago. U. S. section to be owned by International Oil Pipeline Corp., New York City.
Status: Pending Canadian Board of Transport Commission approval. W. C. Gilman & Co., New York City, has made preliminary study.

NORTHERN PIPE LINE CO., 30 Broad St., New York 4, N. Y.
Project: 153-mile 16-in. line from Regina, Sask., to Clearbrook, Minn.
Status: Pending National Energy Board approval.

PEACE RIVER OIL PIPE LINE CO., LTD., Calgary, Alta.
Project: 233 miles of 8-in. from the Milligan Creek area of British Columbia to Trans Mountain Pipe Line in Alberta.
Completion: Possibly in the fall 1960.
Project: 8 miles of 6-in., 45 miles of 8-in., and 17 miles of 12-in. from its Fox Creek Pump Station to Windfall, Virginia Hills, and Swan Hills fields in Alberta.
Status: Approved.

PEMBINA PIPE LINE, LTD., Drayton Valley, Alta.
Project: 70 miles of 3 to 10-in. gathering lines in Pembina field.
Contractor: Mannix Co., Ltd., Calgary.
Completion: December 15, 1960.

RANGELAND PIPE LINE CO., Calgary.
Project: 111-mile line from Cessford field to Calgary.
Status: Pending approval of Alberta government.

TRANS-PRAIRIE PIPELINES, LTD., Edmonton.
Project: 6-8-in. line from Weyburn field to Regina and Moose Jaw, Sask.
Status: Proposed.

Canadian Products Pipelines

BRITAMOIL PIPE LINE CO., LTD., Box 130, Calgary, Alta.
Project: 126-mile 6-in. line from Pincher Creek to Calgary.
Status: Pending approval of the Alberta Oil and Gas Conservation Board.
Project: 64-mile 8-in. line from Dick Lake to Edmonton, Alta.
Status: Pending approval of the Alberta Oil and Gas Conservation Board.

FOOTHILLS PRODUCTS PIPE LINE LTD., (Pembina Pipe Line Co., Mannix Co., Ltd.), Calgary, Alta.
Project: 1,300 miles of 16-in. from Alberta to Chicago.
Status: Proposed.

HUGHENDEN PIPELINE (c/o British American Oil Co., Ltd., 800 Bay St., Toronto).
Project: 125 miles from Dick Lake gasoline plant to underground storage in the Hughenden region of eastern Alberta.
Status: Pending approval of Alberta Oil and Gas Conservation Board.

PROVINCIAL PRODUCTS PIPELINES, LTD.
Project: 700 miles of 3½ to 16-in. line to pick up propane, butane, and condensates from natural-gas plants in Alberta for delivery to refineries and other plants.
Status: Proposed.

WESTALTA PRODUCTS PIPELINE,

a wide range of

MAINTENANCE COATINGS

that will save you money!

What do *your* corrosion conditions require? This, in brief, is Carboline's approach to *each* maintenance problem: a service-proven coating engineered to a specific condition.

From our broad line of experienced maintenance coatings, we have a separate, correct system to match each condition—not one or two "cure-all" systems to fit *all* environments. It is this engineering approach that reduces maintenance costs and assures maximum economy.

Carboline coatings are higher in solids content, which produces greater film build-up and requires fewer costs—reducing labor costs. Superior quality results in longer life and requires fewer recoating cycles—again reducing labor costs. That's why Carboline coatings are *in*expensive and give you better protection, too.

May we have the opportunity to bid your next job? We'll prove we can reduce your maintenance costs.

WRITE TODAY, meanwhile, for Maintenance Chart No. 5 with complete details on 17 different maintenance systems. Also, see our catalog in CEC, pages 911-914.

6005

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Sales engineers in principal cities. Consult your telephone directory.

MAINTENANCE COATINGS WITH EXPERIENCE

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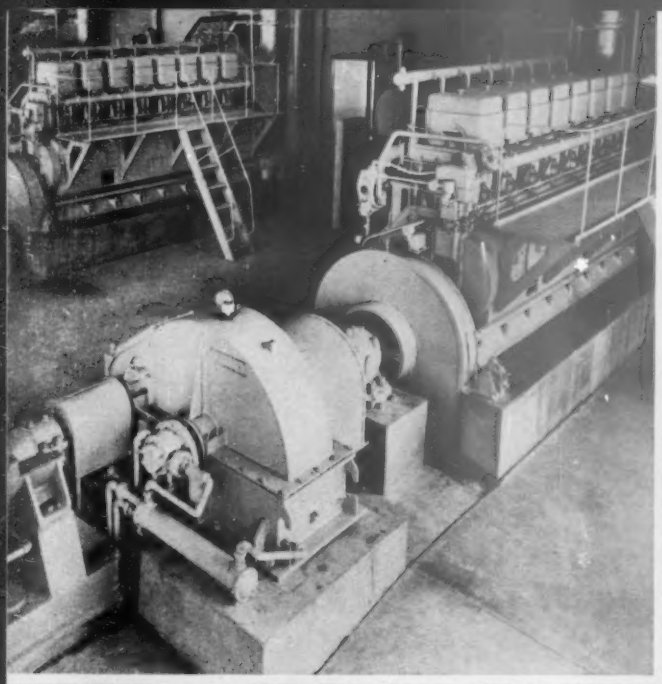

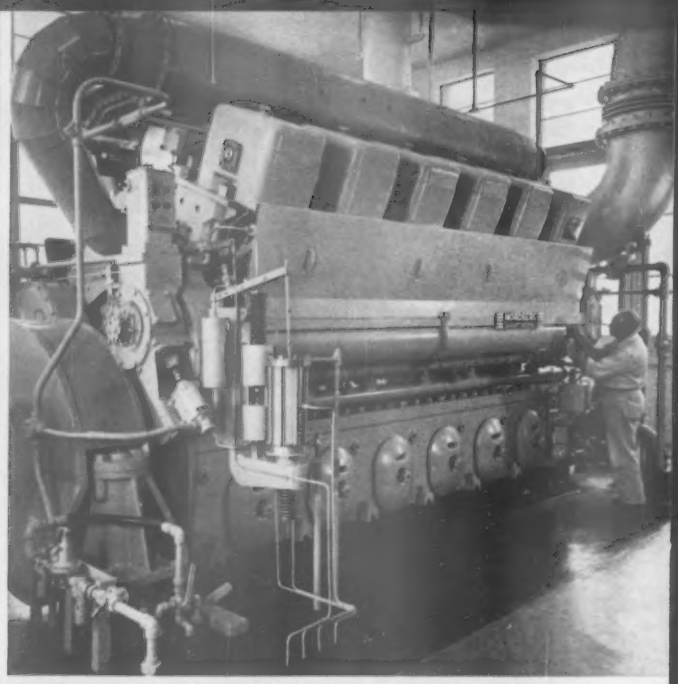

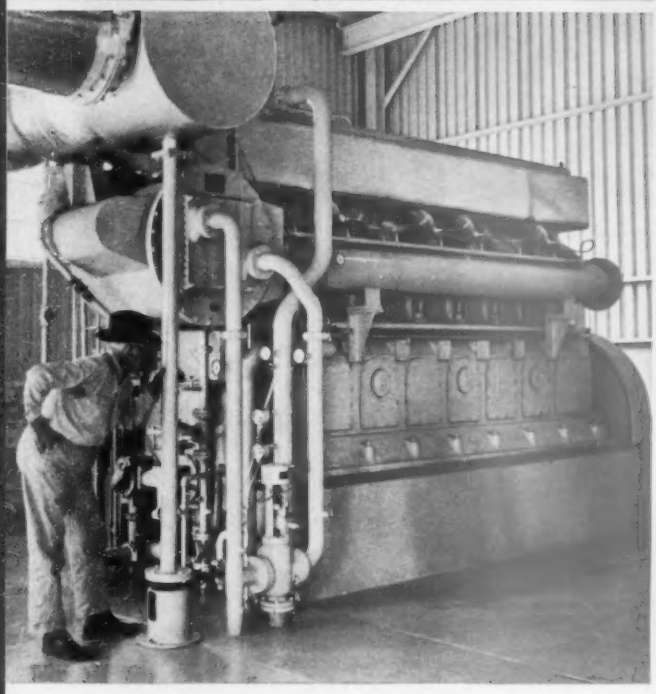

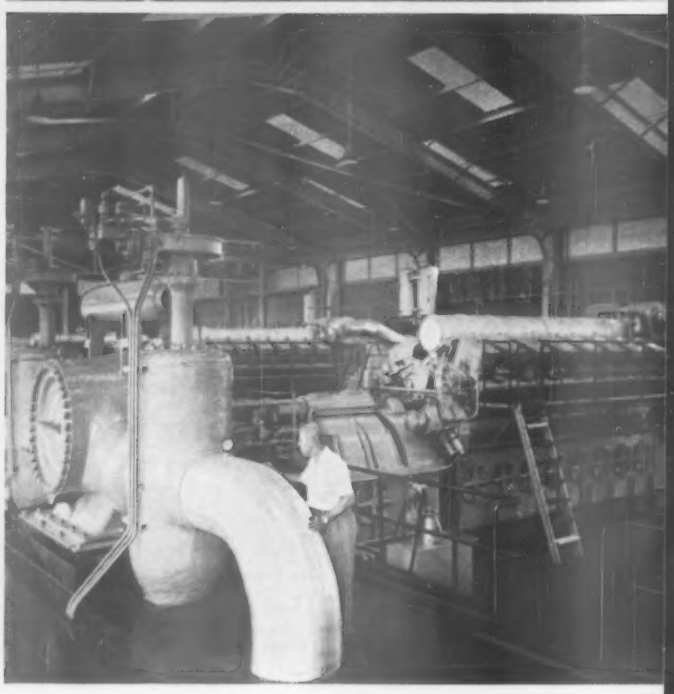

Pipe line engines by Nordberg

Nordberg engines are a sound investment in long term pipe line power. Consult Nordberg on your crude, products or gas pipe line programs.

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NORDBERG MANUFACTURING COMPANY

MILWAUKEE 1, WISCONSIN

ATLANTA • CLEVELAND • DALLAS • DULUTH • HOUSTON • KANSAS CITY • MINNEAPOLIS
NEW ORLEANS • NEW YORK • ST. LOUIS • SAN FRANCISCO • TAMPA
WASHINGTON • TORONTO • VANCOUVER • JOHANNESBURG • LONDON • MEXICO, D. F.

PIPELINE CONSTRUCTION

LTD,. (Pembina Pipe Line, Ltd., Edmonton, Alta.).
Project: 885-mile 4 to 16-in. gathering system to take natural-gas liquids from plants in Alberta for delivery to proposed trunkline to Great Lakes area.
Status: Pending approval of Alberta Board of Public Utility Commissioners.

Canadian Natural Gas Pipelines

ALBERTA GAS TRUNK LINE CO., LTD., Calgary.
Project: 256 miles of 36-in., 75 miles of 30-in., 55 miles of 26-in., 199 miles of various diameter gathering lines, and 42 miles of 16-in. delivery lateral. Main line is from Berland River, Alta., to Crows Nest Pass.
Status: Approved by the Alberta and Canadian governments. Has FPC examiner's approval.

ALBERTA NATURAL GAS CO., LTD. (Pacific Gas & Electric Co., San Francisco, and Westcoast Transmission, Calgary).
Project: 108 miles of 36-in. across southeastern British Columbia to U. S. border near Kingsgate, B. C.
Status: Has Canadian and FPC examiner's approval.

BRITISH COLUMBIA ELECTRIC CO., Vancouver.
Project: 35 miles of 30-in. from Huntington, B. C., to Vancouver.
Completion: 1960.

CANADIAN INDUSTRIAL GAS, LTD. (formerly Ajax Petroleums, Ltd.), Derrick Building, Calgary, Alta.
Project: 28 miles of 10-in. and 4 miles of 8-in. from Morinville to Westlock Viking Sand field.
Status: Planned.
Completion: By September 1961.

CARTIER GAS CORP. (St. Maurice Gas, Inc. and Consumers' Gas Co., Toronto).
Project: 170 miles from Montreal to Quebec City.
Status: Proposed.

GAS TRUNK LINE OF BRITISH COLUMBIA, LTD., Pacific Bldg., Calgary.
Project: 250-mile, 30-in. extension of Westcoast Transmission system from Taylor, B. C., to Fort Nelson.
Status: Planned.
Completion: Late 1961.

MAGNA PIPELINE CO., LTD., Nanaimo, Vancouver Island, B. C.
Project: 25 miles of 4.85-in. double flexible plastic pipe from Huntington, B. C., to Vancouver Island.
Status: Approved by British Columbia Public Utilities Commission. Tentative timetable calls for work to start by spring 1961.

NORTHERN ALBERTA PIPE LINES, LTD., Edmonton, Alta.
Project: 110-mile trunk line, plus gathering system, from Lac La Biche, in McMurray vicinity, to Edmonton.
Status: Pending provincial approval.

NORTHERN NATURAL GAS CO., Omaha.
Project: 73 miles of 20-in. from Savanna Creek to Pincher Creek, Alta.
Status: Planned.
Project: 32 miles of 24-in. from Pincher Creek to Montana border to tie in with planned U. S. line on to Minneapolis.
Status: Planned.

QUEBEC GAS TRANSMISSION LINES, INC., 1610 Sherbrooke St. W., Montreal.
Project: 300-mile line from Montreal to Quebec City.
Status: Proposed.

SASKATCHEWAN POWER CORP., 1739 Cornwall St., Regina, Sask.
Project: 179 miles of 4, 6, and 8-in., in addition to distribution lines and laterals.
Contractor: Banister Construction Co., Ltd., Edmonton, Alta.
Completion: 1960.

TRANS-CANADA PIPE LINES, LTD., Toronto.
Project: 74 miles of 34-in. main-line loop (Burstall to Winnipeg, Man.) and 51-mile 30-in. lateral from Winnipeg to Emerson, Man., to connect with proposed Midwestern system now before U. S. FPC.
Contractor: Majestic Contractors, Ltd., has contract for the 51-mile lateral.
Project: An additional 390 miles of 34-in. main-line loop between Burstall and Winnipeg, Man.
Status: Planned. About 268 miles scheduled for construction in 1961, and 122 miles in 1962.

VAN TOR OIL & EXPLORATION CO., Vancouver, B. C.
Project: Line from British Columbia mainland to Vancouver Island.

WESTCOAST TRANSMISSION CO. LTD., Calgary.
★ Project: 688-mile, 30-in. loop of British Columbia-Washington line.
Status: Proposed.
Project: (See Alberta Natural Gas Co., Ltd., for joint project).

Foreign Crude Oil Pipelines

ABU DHABIE MARINE AREAS, LTD. (partly owned by British Petroleum Co., Britannic House, Finsbury Circus, London E.C. 2).
Project: 20 miles from offshore Persian Gulf pool to Das Island.
Completion: 1962.

ARAB PIPELINE.
Project: 1,250-mile pipeline from the Persian Gulf to Mediterranean.
Status: Proposed by Saudi Arabian Government and approved by the Arab League's petroleum department.

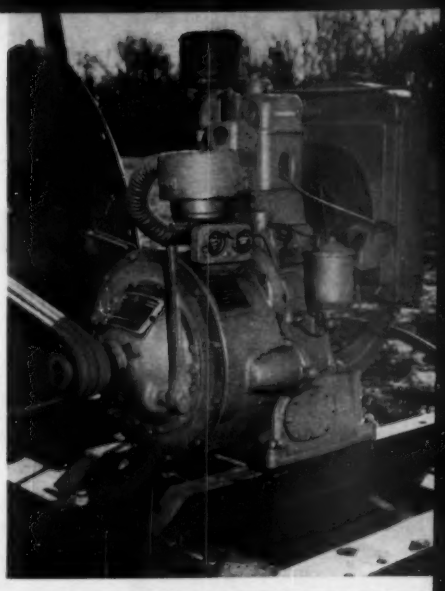
ARABIAN AMERICAN OIL CO., Dhahran, Saudi Arabia, and 505 Park Avenue, New York.
Project: 73 miles of 30-in. loop on Safaniya-Ras Tanura line.
Status: Under way.
Contractor: Company personnel.
Completion: October 1960.
Project: 18 miles of 34 and 36-in. from Qatif to Ras Tanura.
Status: Under way.
Contractor: Company personnel.
Completion: Third quarter 1960.

BARNABO GROUP (Italian interests).
Project: A line from Venice, Italy, to Innsbruck, Austria, which could then be extended to Munich, Germany.

BASRAH PETROLEUM CO.
Project: 65 miles of 30 and 32-in. from Zubair to Fao in southern Iraq.
Contractor: Turriff-Burden, Ltd., Tulsa.
Completion: 1961.

BOLIVIA-PARAGUAY.
Project: 500 miles of 6-in. from Southeast Bolivia to a proposed refinery on Paraguay River, and later to Asuncion.
Status: Planned.

BP TRADING, LTD.
★ Project: 20 miles of 18-in. submarine line in the Persian Gulf, linking a crude-oil collecting platform to Das Island.
Status: Planned.



Power Chief® Oil Field Engines for production pumping

Actual on-the-job operating figures have proved that Power Chief gas engines consistently establish records of reliability and low maintenance. Records show over 43,000 hours of continuous pumping operation with original rings, pistons, liners, valves, bearings and crankshafts still in place.

Built in 1, 2 and 3-cylinder models, these rugged medium-speed units are ideal for production pumping and water flooding service in sizes up to 54 hp, max.

NORDBERG MANUFACTURING COMPANY

Milwaukee 1, Wisconsin

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When you see an eight-eyed spider...

call an *ARANEOLOGIST*

(specialist in spiders)

when you have pipe to weld...
call in *LINCOLN*
(specialists in arc welding)

WHEN bad weather or tough breaks make your completion date seem as elusive as a butterfly, problems with welding rods are as welcome as a snowstorm in July. Weldors are betting their skill against the bonus money . . . and they won't stand for inferior electrodes. That's why pipe gangs all over the world demand FLEETWELD electrodes.

Contractors, too, staking profits against time, have come to depend on LINCOLN rods for consistent quality and operator appeal. Even on X-56 and the new pipes with yields up to 70,000 psi, SHIELD-ARC 85 and 85P give better than the required yield and tensile strengths. And they still have the superb welding characteristics which everyone expects of LINCOLN rods. It's small wonder that practically all major pipelines are welded with LINCOLN electrodes.

In the refinery, don't forget the several different types of STAINWELD for welding stainless and the family of JETWELD low hydrogen electrodes for high tensile or crack sensitive steels.

The next time you want to avoid a welding problem, order LINCOLN electrodes. Or if you have a welding problem, call your LINCOLN Field Engineer.

THE LINCOLN ELECTRIC COMPANY

Dept. 2520 • Cleveland 17, Ohio

LINCOLN WELDERS

PROTECTION
is our business

Nicolet Industries, Inc.
Florham Park, New Jersey

Please, send me samples and specifications of Nicolet Asbestos Pipe Line Felts and "Old Nic" Glass Wrap.

Name_____ **Title**_____

Company_____

Street_____

City_____ **Zone**____ **State**_____

NICOLET, IMPROVED, ASBESTOS "REFLECTO" (WHITE) PIPE LINE FELT REDUCES ENAMEL TEMPERATURES AS MUCH AS 30° F. ... BY SO DOING, GREATLY REDUCES ENAMEL SAG

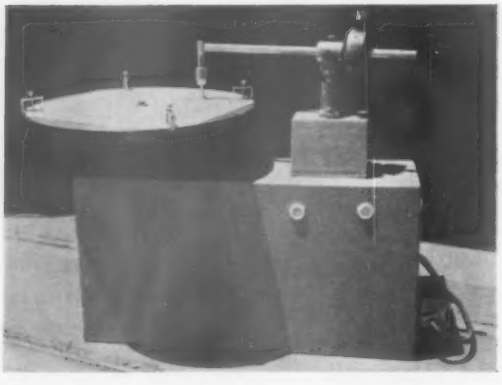
Where high solar temperatures are a factor, Nicolet "Reflecto" (white) Felt is your best protection against pipe line corrosion. It is highly resistant to abrasion and scuffing—and forms a perfect bond with enamel (tar or asphalt). It is light in weight (approximately 10 pounds to the square), is perforated and ¼" parallel glass strand reinforced.

Other Nicolet Pipe Line Protection products are:

Nicolet #15 "Standard" Asbestos Pipe Line Felt, tar or asphalt saturated. Plain or ¼" glass strand reinforced. Perforated or non-perforated.

Nicolet #8 "Tufbestos" Asbestos Pipe Line Felt, tar or asphalt saturated. ¼" glass strand reinforced. Perforated or non-perforated.

Nicolet "Old Nic" Glass Wrap, a uniform, strong, reinforced inner wrap.



Scuff and abrasion test, as above, is only one of the many tests continually being conducted on Nicolet Pipe Line Products.

Distributed throughout the United States • District Sales Offices: Ford & Washington Streets, Norristown, Pa.; P.O. Box 777, Hamilton, Ohio

NICOLET INDUSTRIES, INC.

FLORHAM PARK, NEW JERSEY

PIPELINE CONSTRUCTION

Status: Under way.
Completion: December 1960.

CREOLE PETROLEUM CORP., Caracas.
Project: About 14 miles of 8 to 24-in. gathering line in Lake Maracaibo.

EASTERN BLOCK COUNCIL FOR MUTUAL ECONOMIC AID.
Project: 2,500-mile "Vomecon" pipeline from the Volga-Ural oil fields in Russia to East Europe satillites.
Status: Construction under way in Poland, Hungary, and Czechoslovakia, with completion of latter section by early 1961. Partial operation of the over-all system expected in 1963.

ELBURZ OIL CORP.
Project: 1,000 miles of 38-in. to move Qum crude to the Mediterranean.
Status: Proposed.

ENI (Italian state oil agency) and **ITALO-SWISS FINANCE CO.**
Project: A 700-mile system from Genoa to Aigle, Switzerland, thence northeast to the German border, where it would split with one branch going to Munich and another branch to the Karlsruhe area. Feeder lines would go to Turin, Milan, and Cremona, Italy.
Status: The trunk line from Genoa to Aigle approved by the Italian Government.

ESSO STANDARD (LIBYA), INC.
Project: 100 miles of 30-in. from Zelten field to Gulf of Sirte.
Status: Bids invited. Pipe is being unloaded.

GERMAN LINE planned by eight German refining and marketing companies (British Petroleum, Esso, Deutsche Erdoel, Shell, Gelsenberg-Benzin, Mobil, Schloven-Chemie, and Wintershall).
★ Project: 160-mile, 22-in. line to Bavaria from Karlsruhe which is the northern terminus of the big South European Pipeline Co. project from Marseille to Germany.
Status: Planned.

IRANIAN OIL PARTICIPANTS, LTD.
Project: 30 miles of 20-in. and 22 miles of 16-in. looping of Agha Jari to Bander Mashur line.
Status: Planned.

IRAQ PETROLEUM CO., LTD., 214 Oxford Street, London, W. 1.
Project: 28 miles of additional 30-in. loop in Syria.
Status: Under way.

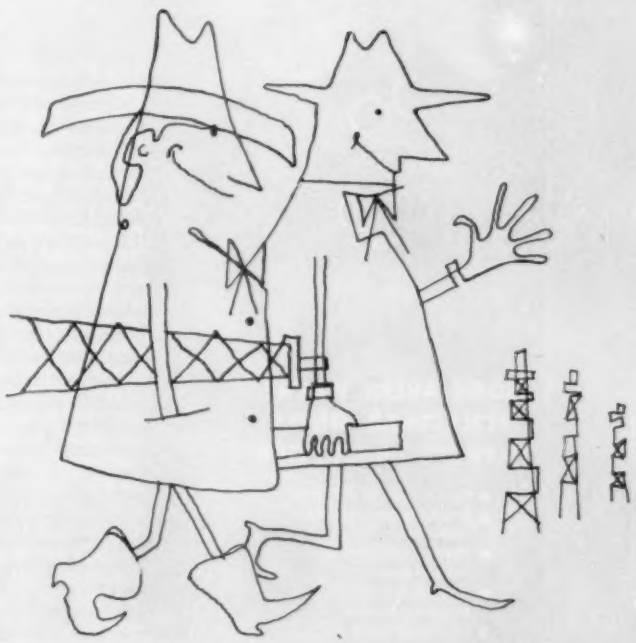
OASIS OIL CO. OF LIBYA, 539 South Main Street, Findlay, Ohio.
Project: 100 miles from Dahra field in Libya to Mediterranean Coast.
Status: Bids invited.

OIL INDIA PRIVATE LTD. (Burmah Oil Co. and Assam Oil Co., two-thirds, and India Government one-third).
Project: 720 miles of line in northeast India. This would include 260 miles of 16-in. from Nahorkatiya to Noonmati and 460 miles of 14-in. from Noonmati to Barauni.
Contractors: Mannesmann, a German firm, will lay the 260-mile 16-in. system. Contract for the 460-mile 14-in. line has been awarded to an Italian Government company.
Completion: The 16-in. system is scheduled for completion in March 1961.

PETROLEO BRASILEIRO S. A. (Brazil).
Project: 250-mile line from Rio de Janeiro to Belo Horizonte refinery site.
Status: Petrobras will invite bidding from companies who have submitted tenders.
Project: 35 miles of 8 to 12-in. pipe from Buracica to Candeia.

"wherever oil men gather"

You don't just walk out and put up an oil derrick. No sir. It takes a lot of planning, plotting, sounding, and the cooperative efforts of geologists, engineers, drillers and oil executives. And it takes a lot of money, too; each foot of well may cost a couple of thousand dollars or so. That's why when oil men get together, sooner or later, someone will mention financial matters. And that's when, more and more, you're sure to hear someone say, "For my money it's THE FORT WORTH NATIONAL BANK!"



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Major refiners report:

IMPROVED DRYING AND PURIFICATION

...WHEN YOU ADSORB WITH LINDE MOLECULAR SIEVES

This is only one of many applications which utilize the high capacity and selectivity of LINDE Molecular Sieves. In fact, Molecular Sieves not only outperform other adsorbents, but do other adsorption jobs never before accomplished. Whether in new installations or as replacement adsorbent in existing units, Molecular Sieves can help you minimize both investment and operating costs. More specifically, here's how they are used. . . .

A major petrochemical company has reduced the CO_2 content of its ethylene from 3000 PPM to less than 1PPM. This high purity is achieved in a single-stage process, automatic and non-corrosive, which has proved to be more economical than the alternative four-stage process. Other petrochemical uses include drying of cracked gases, ethylene, hydrogen, liquid propylene, solvents and many other gases and liquids. **Natural gas producers** use Molecular Sieves for drying and sweetening of natural gas, for sweetening of liquid propane and butane, and for drying of adsorber oil. **Petroleum refiners** use them to gain efficiency in drying reformer hydrogen, liquid butane LPG and transformer oil, and for removal of impurities such as CO_2 and mercaptans. **Refrigeration manufacturers** use Molecular Sieves as a desiccant in super-drying refrigerants to eliminate freeze-up and corrosion.

For these and many other adsorbent applications, you can rely on patented LINDE Molecular Sieves to perform more effectively. They are the top quality material of their kind available today, always uniform, with high capacity, high strength, and high bulk density. They are available in regular and special grades to meet your specifications.

LINDE technical know-how—gained from years of laboratory and field work with adsorption problems—can help make Molecular Sieves work profitably for you. For further information, write: Dept. O-07 Linde Company, Division of Union Carbide Corporation, 270 Park Avenue, New York 17, N. Y. **In Canada:** Linde Company, Division of Union Carbide Canada Limited, Toronto 7, Canada.

SOME AREAS WHERE MOLECULAR SIEVES IMPROVE ADSORPTION

- Purification of ethylene
- Drying gases, liquids, solvents
- Drying, sweetening natural gas
- Sweetening liquid propane, butane
- Drying jet fuels
- Octane improvement
- As refrigerant desiccant
- Controlled atmosphere purification

LINDE COMPANY

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UNION CARBIDE

PIPELINE CONSTRUCTION

ROYAL DUTCH-SHELL.
Project: 12-mile line from Gore Bay, Australia, to Royal Dutch-Shell's Clyde refinery.
Status: Planned.
Project: 161 miles 20-in. line from Tandzung field to Balikpapan refinery, Borneo.
Status: Planned.
Contractor: Williams Brothers Overseas, Ltd., Tulsa, and John Brown, Ltd., London.
Completion: January 1, 1962.

SHELL-BP PETROLEUM DEVELOPMENT CO. OF NIGERIA, LTD., 38/39 Marina, Lagos, Nigeria.
Project: 18 miles of 12-in. line from Port Harcourt to Bonny, Nigeria.
Status: Under way.
Constructor: African Construction Co.

SOUTH EUROPEAN PIPELINE CO. (Jersey Standard, Caltex, Shell, British Petroleum, and 12 other firms.)
Project: 419 mile 30-in. line from Lavers, near Marseille, to Strasbourg, with 40-mile extension to Karlsruhe, Germany.
Status: Construction to get under way by January 1961.
Completion: 1962.

SUPERIOR OIL CO., Los Angeles.
Project: A 16 and 24-in. line from its Lake Maracaibo, Venezuela, production to shore.
Status: Planned.
Contractor: Pipe Line Technologists, C.A., Maracaibo, has design.

SYRIAN PIPELINE, Damascus.
Project: 500-mile line from Karshuk field, Syria, to Mediterranean.
Status: Proposed.

UNION OF SOVIET SOCIALIST REPUBLICS.
Project: 2,315 miles of 28-in. Trans-Siberian crude-products line from Ufa and Tuimazy fields in Bashkiria to Irkutsk.
Status: Under way.
(See Eastern Block for information on new East Europe line).

YACIMIENTOS PETROLIFEROS FISCALES (Argentina), Buenos Aires.
Project: 390 miles of 14-in. from fields in Neuquen Province, Argentina, to Bahia Blancha.
Status: Bids requested.
Project: 625 miles of 12-in. from Mendoza to San Lorenzo.
Status: Planned.

YACIMIENTOS PETROLIFEROS FISCALES BOLIVIANOS, La Paz.
Project: 407-mile 12-in. line from Camiri to Sica Sica.
Status: Planned.

Foreign Products Pipelines

ARABIAN AMERICAN OIL CO., Dhahran, Saudi Arabia, and 505 Park Avenue, New York.
Project: 37 miles of 8-in. LPG line from Abqaik to 'Ain Dar.
Status: Planned.
Contractor: Company personnel.
Completion: 1961.
Project: 6½ miles of 6-in. LPG line from Ras Tanura refinery to the terminal.
Status: Under way.
Completion: Fourth quarter 1960.

ESSO PETROLEUM CO., LTD., 36 Queen Anne's Gate, Westminster, London, S.W. 1.
Contractor: Techint, Inc., Milan, Italy.
Project: 80 miles of 24-in. to tie in to proposed Caxias refinery near Rio de Janeiro.
Status: Planned.
Project: 70-mile ethylene line from the Fawley refinery to Severnside.
Status: Planned.

ESTRADA FERROVIARIA SANTOS A JUNDIAL, Sao Paulo, Brazil.
Project: 25 miles of 6-in. ethylene line from Cubatao to Rio Grande.
Status: Pending approval.
Contractor: Techint, Inc., Milan, Italy.

NATIONAL IRANIAN OIL CO., Teheran.
Project: 510 miles of 8-in. from Teheran to Meshed, Iran.
Status: Under way.
Contractor: Williams Brothers, Tulsa, has contract for about half this project.

NORTH ATLANTIC TREATY ORGANIZATION (Bid details from Bureau of Foreign Commerce, U. S. Department of Commerce, Washington).
Project: 57 miles of 8-in. in Germany to Land Baden-Wuerttemberg air field.
Status: Planned.
Project: 93 miles of 6-in. in Turkey.

PETROLEOS MEXICANOS.
Project: 291 miles of 8-in. from Torreon to Chihuahua.
Status: Planned.
Completion: March 1961.

PIPELINES OF PUERTO RICO, San Juan.
Project: 95 miles 8-in. from Penuelas to Catano.
Status: Approved by Puerto Rican Public Service Commission.

SYRIAN PIPELINE.
Project: About 310 miles from Homs to tank farms in the Damascus, Aleppo, and Latakia areas.
Status: Bidding deadline past.

UNION OF SOVIET SOCIALIST REPUBLICS.
Project: 2,315 miles of 29-in. Trans-Siberian crude-products line from Ufa and Tuimazy fields in Bashkiria to Irkutsk.
Status: Under way.
Project: 700 miles from Novo-Kuibyshev refinery to Bryansk.
Status: Under way.

YACIMIENTOS PETROLIFEROS FISCALES (Argentina), Buenos Aires.
Project: 652 miles of 10-in. from Lujan de Cuyo to Buenos Aires.
Status: Planned.

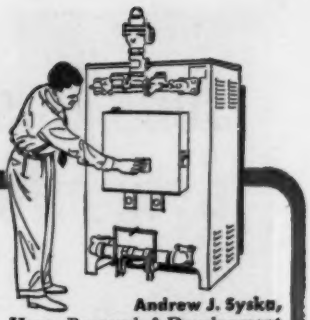
Foreign Natural Gas Pipelines

CREOLE PETROLEUM CORP., Caracas.
Project: 18 miles of 30-in. and about 13 miles of 8 to 24-in. from stations in Bachaquero area to the Bachaquero compressor plant.
Status: Under way.
Completion: October 1960.

GASES NATURALES DE COLOMBIA, S.A. (Owned 50% by Colombian Petroleum Co., which is affiliated with Mobil International and Texaco, and 50% by local interest.)
Project: 140 miles of 10-in. from Cicuco field to the Caribbean port of Barranquilla.
Completion: Late 1961.
Project: 75 miles from Rosh-Zohar field to Ashdod Yam.
Status: Proposed.

INDIA.
★ Project: India plans to start formal talks with Pakistan soon concerning possibility of importing natural gas from Sui field into India.
Status: Preliminary studies indicate a pipeline to Bombay might be commercially sound.

IRAQ GOVERNMENT.
Project: A natural-gas line from Rumaila



Andrew J. Syska,
Hayes Research & Development Engineer Reports . . .

KNOW-HOW IS VITAL IN GAS AND LIQUID DRYING

When we developed the Molecu-Dryer®—a unit specially designed to take advantage of the remarkable drying, sweetening, and purifying capabilities of Linde Company's Molecular Sieves—our chief interest was in drying protective atmospheres (hydrogen, dissociated ammonia, etc.) for metallurgical work—to dewpoints well below –100°F. A natural outgrowth of the Molecu-Dryer was the *Nitro-Gen*®*—an automatic cycling generator which produces low cost, high purity nitrogen for blanketing, purging, protecting. Our engineering people have also explored whole new worlds of gas, liquid, and atmosphere drying and separating problems.

NEW DRYING NEEDS APPEAR DAILY

In manufacturing transistors, for example, the Molecu-Dryer has been able to effect big economies by supplying moisture-free air in place of tank nitrogen to protect transistor assembling and sealing operations. Other current projects: instrument air drying, gaseous CO_2 drying, gas separating . . . also drying and separating of liquid or gaseous hydrocarbons.

EQUIPMENT DESIGN IS DYNAMIC!

Each new area of work has necessitated engineered application of standard or special Molecu-Dryer models, to provide optimum adsorption efficiency, top capacity at minimum equipment cost, job-coordinated cycle times, and fast desorption and cooling.

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For a comprehensive picture of the Molecu-Dryer, write for Bulletin 5703.

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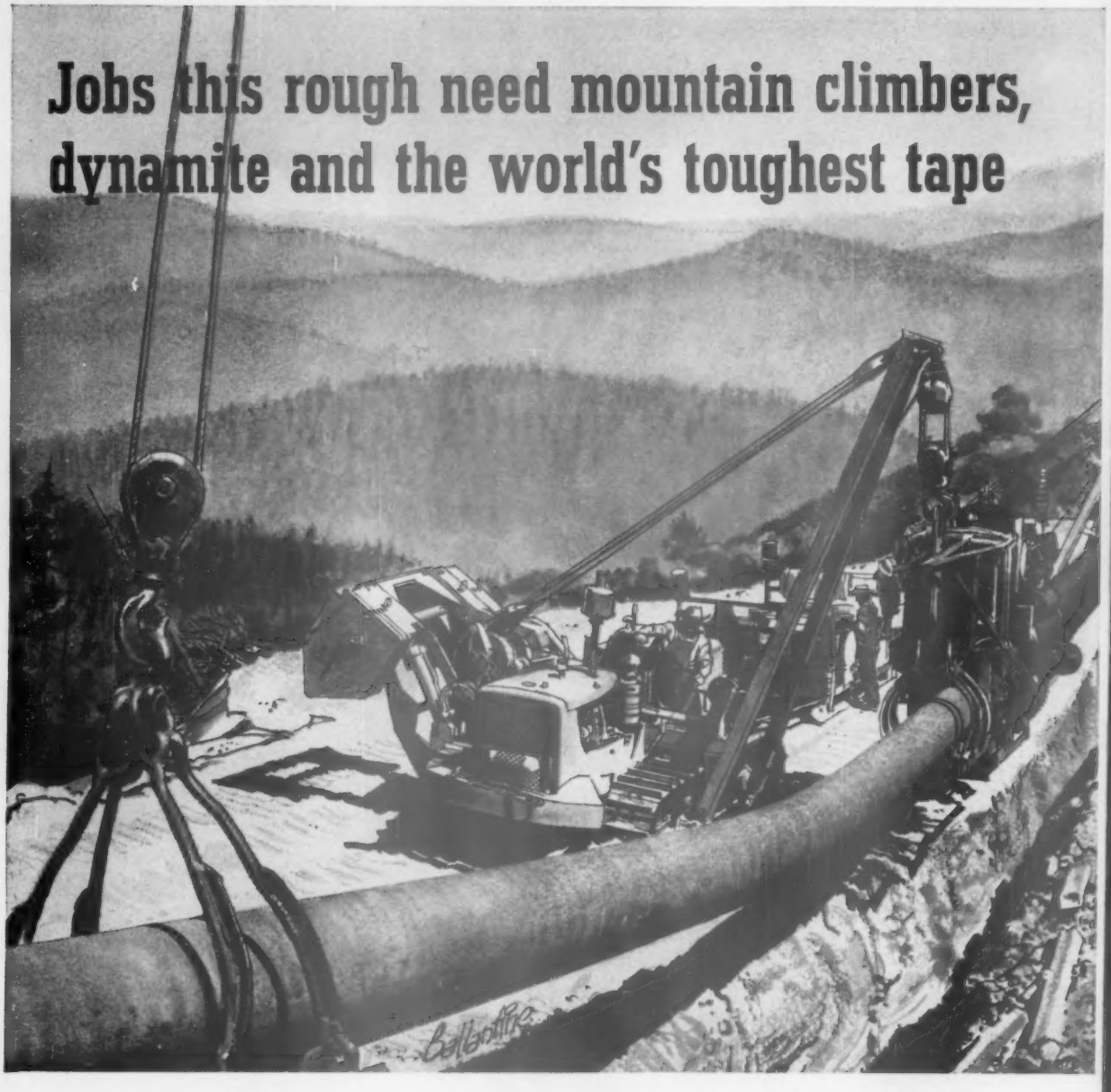
Jobs this rough need mountain climbers, dynamite and the world's toughest tape



New Mandalay line goes through solid rock, up 40% grades, over 8,000-ft. mountains—with Polyken protection all the way

Before they took on 50 grueling miles of treacherous southern California mountains, the Richfield Oil Company people gave their materials a pretty thorough going over. Among other things, they made doubly certain of their protective coating.

Most Practical Protection Yet

They used Polyken's latest development, Extra Strength No. 960 Pipeline Roll. Like a lot of other large companies in recent years, they discovered that Polyken is the toughest, most practical protection you could ask for in modern pipe coating.

Many Hundreds of Miles of Proof

Who are these other companies? There's the Houston Texas Gas and Oil Corporation. They put Polyken tape on 1600 miles of gas line from Louisiana to Florida. The National Iranian Oil Company used Polyken for 200 miles of desert and mountain line. Phillips Petroleum put Polyken on several hundred miles of line in Texas and Canada. Jagged rock, coral swamp,

Using tensioned-spindle equipment, pipe is cleaned and wrapped in one factory-smooth operation. Polyken Tape is ready. No primer, no drying or cooling. No fumes or fire hazards.

burning sand and frozen ground—Polyken is at its best under the worst conditions.

The Question to Ask

When you start inquiring, be sure to ask these companies about relative costs. Compare Polyken with hot dope, and see for yourself how much they saved.

The Polyken method gets more footage *per day*, with far fewer men. With far less equipment and hauling costs. In fact, you have fewer problems all around—and enduring protection.

To get the complete details on savings and durability, check with your Polyken representative or call the Polyken Tape Coating Distributor nearest you. Or simply write Polyken, 309 West Jackson Blvd., Chicago 6, Ill.

THE MODERN WAY

Polyken®

EXPERIENCED IN PROTECTIVE COATINGS

THE KENDALL COMPANY
Polyken Sales Division

PIPELINE CONSTRUCTION

oil field to Basrah.

MENE GRANDE OIL CO., Caracas.
Project: 19 miles of 12-in. from East Soto to Zapatos.
Completion: 1960.

PAKISTAN INDUSTRIAL DEVELOPMENT CORP.
Project: Further extension of the Sui-Multan system into northern West Pakistan.
Status: Under consideration. Technical survey has been ordered.

PAKISTAN PETROLEUM CO.
Project: 145 miles of 8-in. from Sylhet field to Daccq, East Pakistan.
Status: Proposed.

PETROLEOS MEXICANOS.
Project: 483 miles of 24-in. from Jose Colomo field in State of Tabasco to Mexico City.
Status: Under way.
Contractors: Condusa is contractor. Contracts for eight river crossings awarded to Collins Construction Co., Port Lavaca, Tex., and Constructora Inde S. A. de C. V., Mexico City.
Completion: November 1960.
Project: 200 miles of 14-in. from Mexico City to Salamanca.
Status: Planned.
Completion: September 1961.
Project: 291 miles of 12-in. from Torreon to Chihuahua.
Status: Planned.
Completion: March 1961.

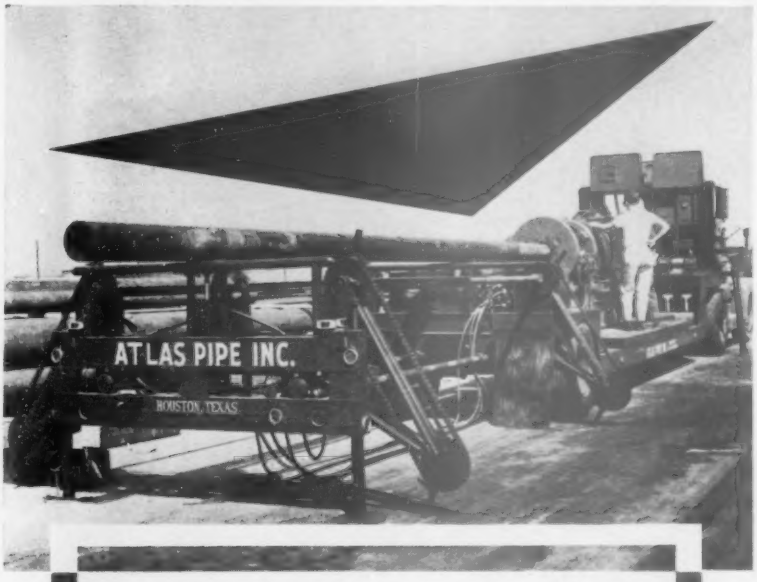
SN REPAL.
Project: A 327-mile system from Hassi R'Mel gas field in Algeria, to the Mediterranean. Trunk will be 24-in. with a 20-in. branch to Oran and 16-in. branch to Algiers.
Contractor: Groupement Entrepose-Ste. Parisienne pour l'Industrie Electrique (GREP) has contract for 200 miles from Hassi R'Mel to Tiaret.
Status: Under way.
Completion: Spring 1961.

SOC. SICILIANA METANADOTTI (SOSIM). Partners include Edison Power, Italcementi, Fiat Motor, Sicilian SGES Power, Bombrini Parodi Delfino Chemical, and Montecatini.
Project: 560 miles from Hassi R'Mel gas field, Algeria, to Cape Bon, Tunisia, 77 miles across the Sicilian Channel, and a route well into northern Italy which would run less than 1,000 miles farther.
Status: Engineering studies under way.

STANDARD-VACUUM OIL CO., New York.
Project: 60 miles of 8-in. from Radja field to Palembang, Sumatra.
Status: Planned.

UNION OF SOVIET SOCIALIST REPUBLICS.
Project: Two parallel, 40-in. lines, each over 1,300 miles long, from Gazli, near Bukhara, northward to Sverdlovsk and Chelyabinsk.
Status: Planned.
Project: Line from Samarkand through Tashkent to Chimkent, Dzhambul, Frunze and Alma-Ata near Chinese border.
Completion: Line from Samarkand to Tashkent expected to be finished in 1960. Completion of rest of line expected by 1965.
Project: Line from Berezovo field southward to Sverdlovsk.
Status: Proposed.
Project: 438 miles from Dashava in Carpathian Mountains to Minsk.
Status: Under way.
Completion: 1960.
Project: Line from Minsk northward to Baltic Sea area.
Completion: To Vilnius, Lithuania, in 1961; to Riga, Latvia, in 1962.
Project: Line from Minsk northeast to Leningrad.
Status: Proposed.
Project: 405 miles from Saratov north to Gorki via Penza.
Status: Under way.
Completion: 1960.
Project: 800-mile, 32-in. loop of existing line from Stavropol fields in northern Caucasus to Moscow.
Status: Under way.
Completion: 1960.
Project: 800-mile, 40-in. line from Krasnodar fields north of Caucasus Mountains to Serpukhov, south of Moscow, via Rostov and Lugansk.
Status: Under way.
Project: 310-miles of 32-in. line ringing Moscow at radius of about 50 miles.
Status: Under way.
Completion: 1962.

YACIMIENTOS PETROLIFEROS FISCALES (Argentina), Buenos Aires.
Project: 1,000-mile line from Comodoro Rivadavia to Buenos Aires with a spur to Plaza Huincul field in Neuquen province. Line will be 26 in. to the connecting point for the Plaza Huincul link and 30 in. from the connection to Buenos Aires.
Status: Bids sought.



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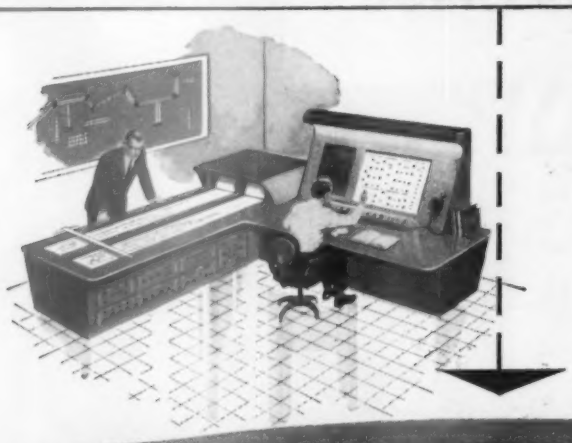
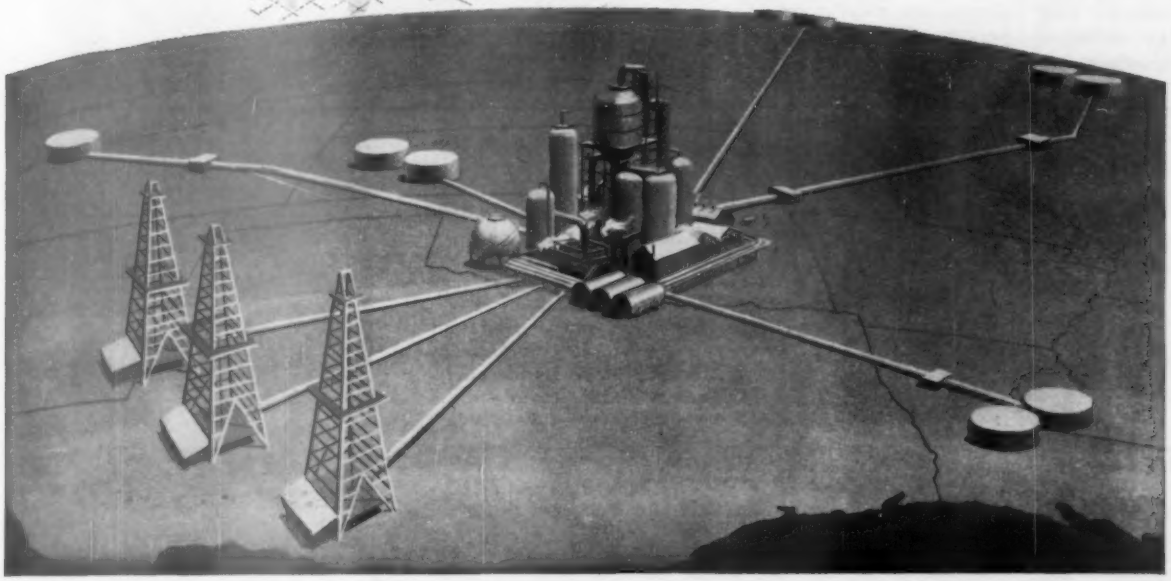
Link Industrial Control Systems Engineering...



SIMULATING PRODUCTS PIPELINES WITH LINK Dialog*



Optimum pipe line operation requires fast and accurate analyses of the many variables involved to assure economic delivery of pipe line products.

A Link Pipe Line Simulator is an indispensable tool for **profit-minded** pipe line management. It incorporates high-speed digital/analog computing techniques to—

- analyze economic capability of pipe line
- predict and program varying product demands
- compare operating alternatives
- study operational techniques

With the Pipe Line Simulator, you can be assured of reducing operating costs because it provides—

- precise scheduling of multiple product requirements
- reliable and dependable dispatching
- rapid re-scheduling to meet 'up-sets' or emergencies
- engineering data for design and systems study

The Dialog* Pipe Line Simulator is just one of the many Link engineered systems for serving the control, scheduling and analysis demands of the petroleum, gas, and petro-chemical industries.

For specific details on Link Dialog Pipe Line Simulators, write to J. C. Croft, Jr., Manager, Industrial Control Products, Link Division, General Precision Inc., Binghamton, N. Y

DIALOG* (Link Digital-Analog System Components and Building Blocks)

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another example of Link / ability

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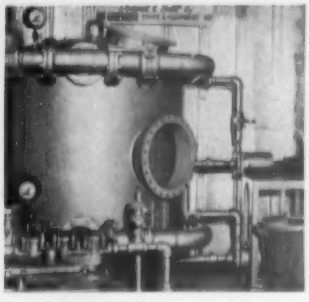
▶ ▶ ▶ New Equipment Section

This week's SHOWCASE features . . .

Portable pipe-repair kit

. . . is available, designed for simple yet fast and permanent repairs to pipe and tubing, pipe joints, pipe fittings, and tank and other vessels. The Util-Seal kit based on epoxy resin serves as a carrying case and is small enough to be carried as spare gear on service trucks.

Among the repairs that can be made with the kit are leaking bell and spigot joints, flanges, saddles, caulked sleeves, cracked valve bonnets, and leaking threads. The package contains individual portions of resin, activator, and fibrous reinforcer, as well as a collector ring and pressure relief vents for use during the setting-up period. Source: **Dresser Mfg. Div., Bradford, Pa.**



Portable water-flood plant

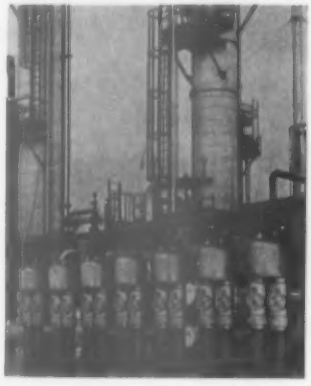
. . . now available is a compact and complete unit. Components include a triplex pump handling up to 2,600 bbl. per day at pressures up to 3,000 psi.; a 20-hp., 440-volt, dripproof motor; 5-hp. centrifugal backwash pump; ½-hp. charge pump; piping and valves; insulated unions; 8 by 14 by 8 ft. building enclosing all equipment; panel board with all motors and electrical outlets individually controlled and fused and wired for 440-volt, three-phase power; a precision chemical pump with piping and chemical container; pressure and flow-control valves; discharge pressure gage; and other necessary equipment.

The packaged plant is completely skidded and measures 9 by 17½ by 10½ ft. Source: **B. G. Harmon Service & Equipment Co., Carmi, Ill.**

●

New gas-desulfurizing

. . . unit called a Sweet-A-Mine unit, is an automatic, amine type which, the maker reports, performs unattended without any utility requirements other than supply gas, pneumatic-operated valves, and fuel gas for the reboiler. It comes in capacities of 500 M.c.f.d. and more. Source: **Maloney-Crawford Tank & Mfg. Co., Box 659, Tulsa 1.**



Aboveground electrical fitting

. . . now being marketed, the Type EAM Condulet, is an explosionproof, dust-ignition proof, and weather-resistant aboveground manhole type designed to provide a convenient means for splicing main feeder cable and making branch taps. It is designed to replace the conventional, expensive belowground manhole which is often difficult to work in due to gas contamination or accumulation of water. The fitting provides a means for inspecting connections at any time as the cover is easily removable. Too, the interior does not have to be filled with hot insulating and waterproofing compound.

The fitting, listed with and without a terminal block, is suitable for voltages up to 600. Its deep dome cover has an internal thread which provides

Want more facts about equipment or copies of product literature described in this issue?

Send this **Showcase Coupon**

to manufacturer at address shown in bold type after each item.

Product name, Model no., literature title or number: .....

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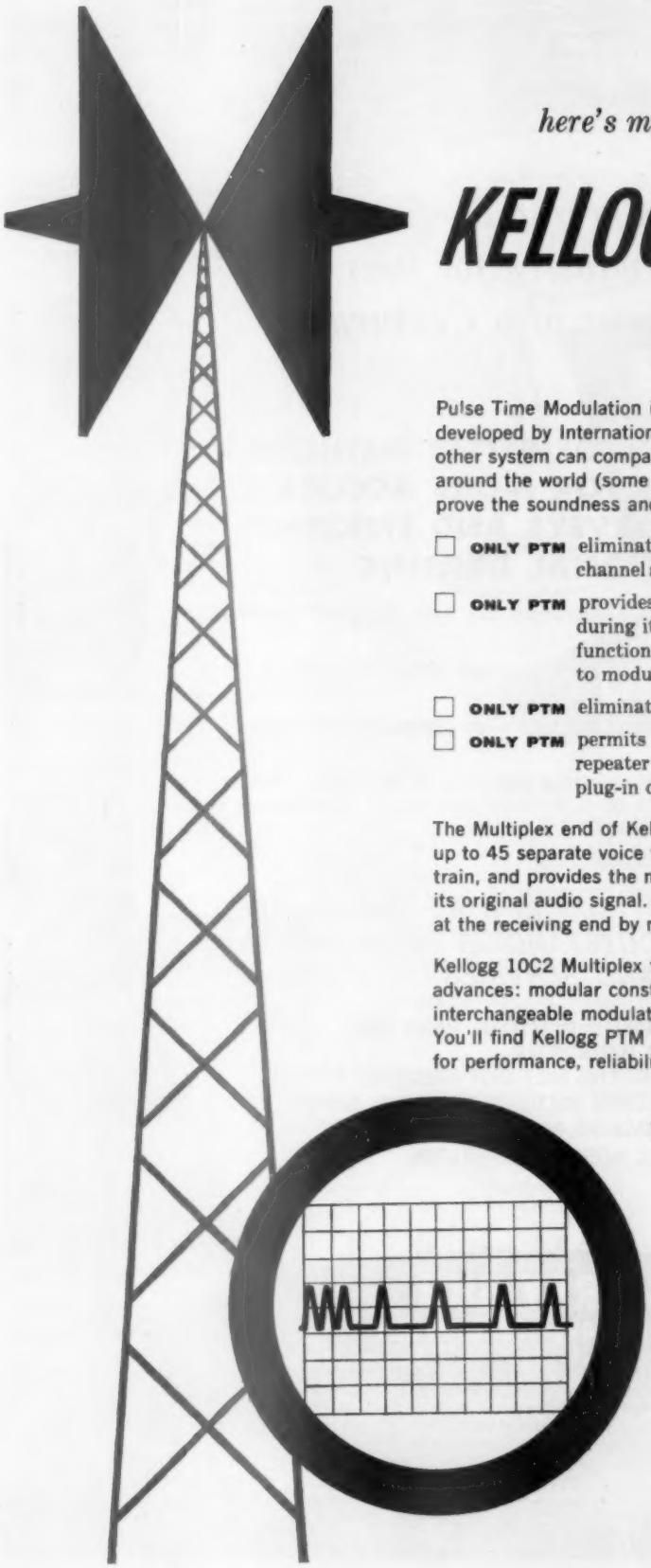
COMPANY .....

ADDRESS .....

CITY ..... STATE .....



here's microwave at its simplest and best!

KELLOGG 10C2 PTM MICROWAVE

Pulse Time Modulation is the foolproof microwave pioneered and developed by International Telephone and Telegraph Corporation. No other system can compare with it in simplicity and reliability. Installations around the world (some dating back to ITT's early systems in the '30's) prove the soundness and reliability of PTM.

- ☐ **ONLY PTM** eliminates complicated tuning or filtering for voice channel separation. All demodulators are interchangeable.
- ☐ **ONLY PTM** provides separate and distinct channels, open only during its own time interval. Therefore S/N is not a function of channel loading; each channel is insensitive to modulation on the other channels.
- ☐ **ONLY PTM** eliminates frequency displacement over the voice channels.
- ☐ **ONLY PTM** permits *any number* of channels to be dropped at a repeater station. Only one additional modulator and one plug-in demodulator are required to drop each channel.

The Multiplex end of Kellogg 10C2 Microwave system can combine up to 45 separate voice frequency channels into a Time-Modulated Pulse train, and provides the means for restoring each of the channels into its original audio signal. Each signal is sorted into its proper channel at the receiving end by means of the distinctive marker pulse it carries.

Kellogg 10C2 Multiplex features the latest and most efficient engineering advances: modular construction, printed circuitry, plug-in channel units, interchangeable modulators and demodulators, and many others. You'll find Kellogg PTM Microwave meets your highest specifications for performance, reliability and engineering design.

Complete technical details will be sent on request. Write to Kellogg's Microwave Division, Box 2725, Raleigh, North Carolina.

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ORIGINATED use of non-magnetic drill collars—an outstanding contribution to directional drilling.
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an overlapping junction which will shed rain. Equipped with two 4-in. conduit openings in the bottom, it can be had with a maximum of four 1¼-in. branch openings adjacent to the main hubs. Source: **Crouse-Hinds Co., Syracuse 1, N. Y.**

●

Safety-relief valve

. . . on the market provides, according to the maker, precise blowdown ring control for gases and vapors and safety relief for liquids in several applications where maximum pressure is 300 psi.

The Series 1870 valve has a one-piece stainless steel body and stainless-steel disk which contains inlet pressure, the maker says, without other joints or gasketing. The maker claims the one-piece stainless steel construction provides a leakproof seat that eliminates waste and corrosion problems.

The valve comes with tungsten-steel springs for temperatures up to 800° F. and offers a choice of plain cap, packed cap and lever, or open level. Inlet connections include male screwed or 150 or 300-lb. raised-face flange types. Source: **Farris Engineering Corp., 402 Commercial Ave., Palisades Park, N. J.**

●

New tank

. . . resists corrosion as it is an epoxy-resin-bonded, glass-filament-wound type which, the maker reports, is particularly applicable (1) in the storage of sour crude oil, (2) for water-flood and salt-water-disposal processes, and (3) for offshore and other areas where external corrosion is a problem.

The Poxyglas tank is said to be resistant to all fluids normally en-

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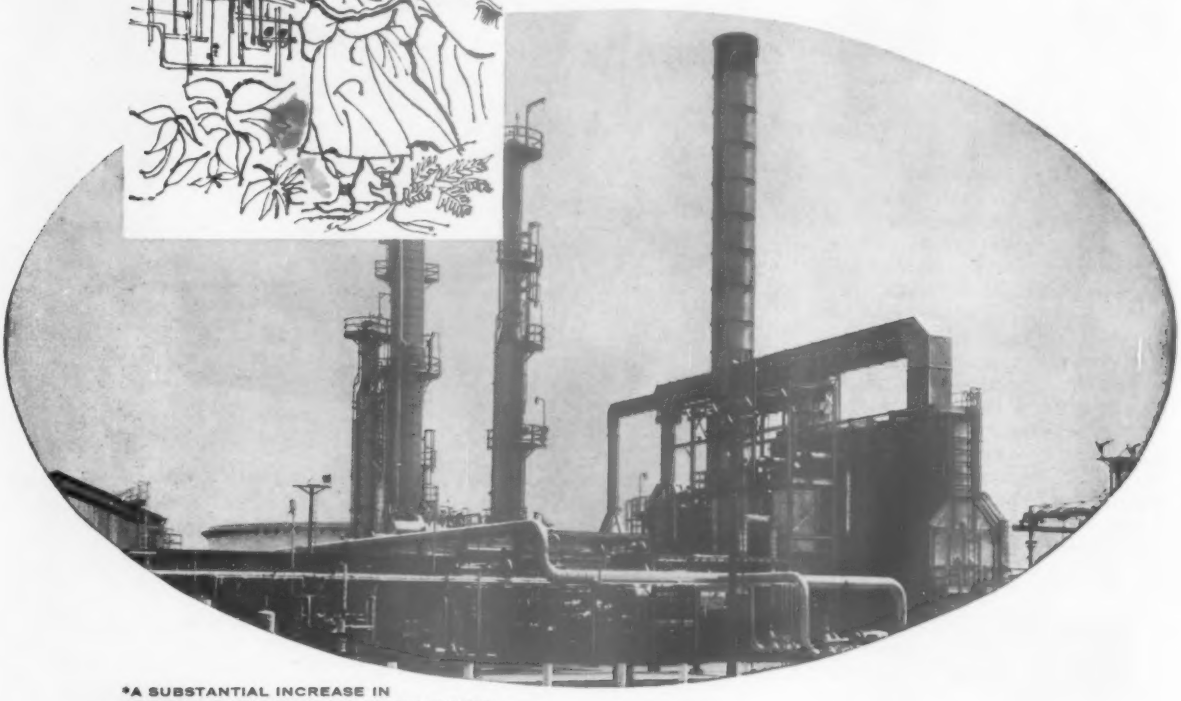

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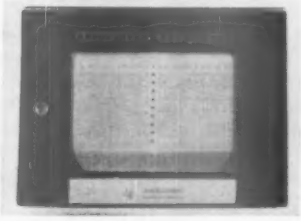
countered in oil-field production. Additionally, it is light in weight and has high-strength properties. The tank comes in diameters up to 12 ft. It is said to be nontoxic and odorless, making it readily adaptable for use in storage, distribution, and transportation of corrosive materials and products which cannot stand contamination.

The tank is constructed of glass-filament rovings and epoxy resins. Strong glass filaments (0.000368-in.-diameter) are wound on a mandrel. The rovings are helically interwoven and bonded with the epoxy resins into a pattern for designed strength characteristics. In the tank-making process, the shell and head are wound as an integral structure. Shell wall is 0.125 in. thick. The bottoms are molded by a filament-wound mat process incorporating a special flange construction for attachment to the shell. Source: **Black, Sivalls & Bryson, Inc., 7500 E. 12th St., Kansas City 26, Mo.**

●



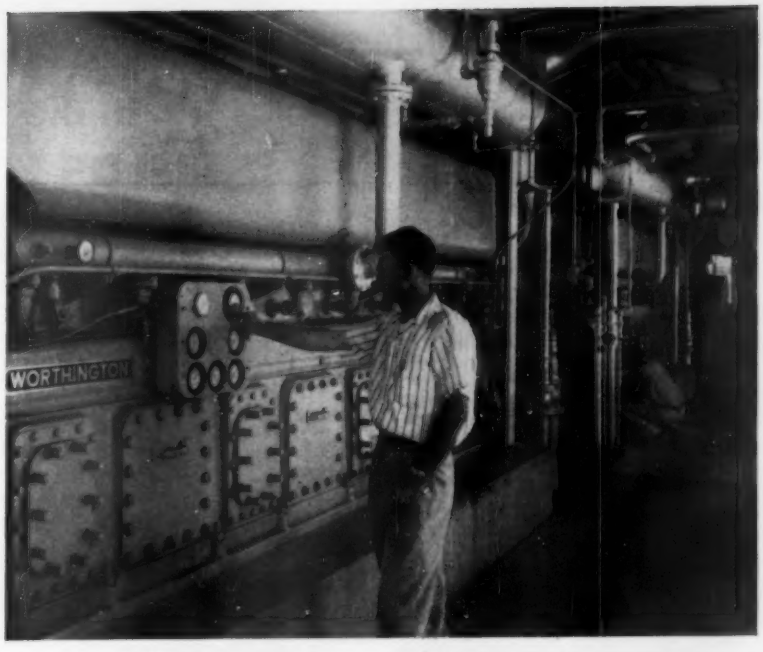
Flush-mounting recorder

. . . a new version of the maker's Rectiriter galvanometric recorder, is available for panel installations. The recorder, featuring rectilinear recording motion, comes in single and dual-channel models with swing-out chart carriages and a slideout chassis. An illuminated scale makes the strip chart easy to see at a distance. Source: **Texas Instruments, Inc., 3609 Buffalo Speedway, Houston 6.**

●

Releasing rope socket

. . . now on the market is designed to permit use of the full strength of the wire line during swabbing operations yet give immediate and positive release when the swab becomes stuck due to debris in the well. In effect, the device is a swabbing-line safety joint which, according to the manufacturer, allows full use of the ultimate strength of the line and, at the will of the operator, assures positive release and removal of the wire line

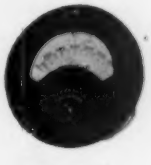


Like an extra supervisor on the compressors

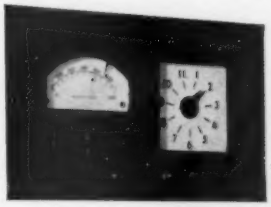
***Alnor* Pyrotac®**

The Pyrotac is on the job 24 hours every day with unfailing engine protection. Improper injection, blow by, stuck rings, failure of cooling, overload, or other malfunctioning of the engine is immediately registered by the individual exhaust thermocouples and is indicated on the dial of the Pyrotac. When the instrument is set for the normal exhaust temperature range, any variation up or down shows up immediately on the Pyrotac dial.

Model FAX
a low cost manual operated multipoint pyrometer with capacity up to 16 circuits. Has splash proof case. Can be operated directly on engine or switchboard. Flush or surface mounting.



Motorized Pyrotac
gives a check on the operating efficiency of each cylinder by continuously registering the temperature of each exhaust. If the temperature varies up or down from a preset range, thus indicating a malfunctioning of any cylinder, an alarm is sounded to inform the operator so that the trouble can be spotted immediately. The motorized Pyrotac is available for indicating up to 20 circuits.



The low cost of the Alnor Pyrotac compared with the protection provided make its place on the control panel an indispensable safeguard. That is why many compressor power plants are now Alnor equipped.

Alnor INSTRUMENTS

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Wheeling, West Virginia

West Coast Factory: Woodlake, California

from the hole, leaving a clean, sure fish to engage and recover.

The releasing rope socket is designed primarily for use with swabbing lines where the swab may have become stuck in the well due to perforator and other debris. Source: **Bowen Itco, Inc., Box 4587, Houston 13.**

●

New combination bit

. . . is on the market which, the maker claims, combines the desirable features of both the drag and the rock bit to produce a superior drilling tool for soft and intermediate formations. Major advantages claimed are: higher penetration rates, straighter holes, lower torque, less weight, and smoother rolling action. The bit is available in sizes ranging from 12 to 18¾ in. Source: **Hunt Tool Co., Box 1436, Houston 1.**

●

Storage boxes

. . . for a line of pipe-beveling machines are now being built of aluminum instead of steel which, according to the maker, reduces the weight of the boxes by about two-thirds. The new boxes provide the same strength and protection as the older steel models with the added advantage that they require no painting and won't rust. Source **H & M Pipe Beveling Machine Co., 311 E. 3rd., Tulsa.**

●

Sound velocity logs

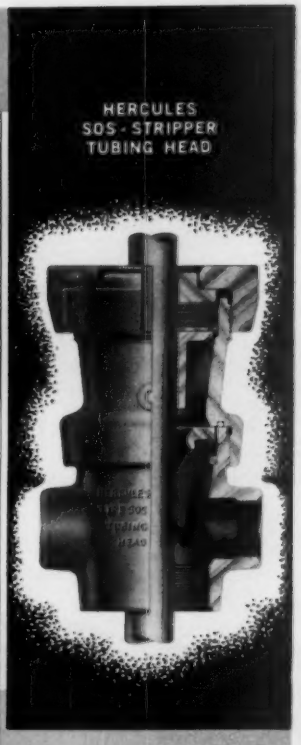
. . . offered which record simultaneously a 1-ft. spaced curve, a 3-ft. spaced curve, and either a self-potential or a gamma-ray curve. Called Dual Spaced Acoustilog, the new service is considered a major advance over the original, single-spaced equipment developed to assist in the in-

TWO HEADS ARE BETTER THAN ONE . . .

Except when it is a Hercules Type SOS Stripper Tubing Head.

This head is engineered to fulfill every field requirement for a medium pressure stripper tubing head. Its simplicity of design and ease of operation are outstanding features, and it consistently performs above recommended pressures, when needed.

But this head leads a double life. Remove the cap and the lower body section and put them together. You then have an SO Type Tubing Head that is compact and ideal for pumping a previously flowing well. **This is just one of many Hercules features that continuously give you more for your money.**



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Sikorsky helicopters—hauling heavy equipment, parts, supplies and men right to the job—are working as trucks for: Okanagan Helicopters Inc., Petroleum Helicopters Inc., Rotor-Aids Inc., and Worldwide Helicopters Inc. Such companies lease Sikorsky helicopters to a wide range of industries to do a variety of trucking jobs. In a fraction of the time that it takes an on-the-road truck, and at less cost, helicopters deliver the goods.

Working as trucks, Sikorsky helicopters are busily engaged in oil exploration, pipeline and transmission line construction, geodetic surveys and cargo transfers.

For the Puerto Rico Water Resources Authority

IT'S A CRANE

In Puerto Rico, work crews for the Water Authority once needed three to four *months* to plant 100 transmission-line poles. Now, one crew plants 100 poles in *one day* with just one Sikorsky helicopter. "Without the helicopter, it used to cost as much as $380 to set a pole. With the helicopter working as a crane, costs have tumbled to $35 to $75 a pole," reports Rafael R. Ramirez, the Authority's assistant executive director.

As cranes, Sikorsky helicopters are solving costly, time-consuming problems everywhere with a new approach—from the air. The result: lower costs, higher profits.

For the Indiana Gear Works

IT'S A COMPANY CAR

At the Indiana Gear Works, a Sikorsky S-51 helicopter (the newer S-62, shown above, is now available) speeds management personnel from company offices to outlying plants, from plant to plant, and out to the airport. "The saving in executive hours is almost incalculable," reports one official. This not only means time saved, money saved, but *more business accomplished.*

As company cars, Sikorsky helicopters are also ferrying high-salaried personnel city to city, city to airport and company office to customer's office. Helicopters are freeing executive hours for more productive work.

Sikorsky helicopters did all these things first. Altogether, they do more of these jobs today than all other vertical lift aircraft. To learn how your company can gain from the work of a Sikorsky helicopter truck, crane or company car, write to Sikorsky Aircraft today.

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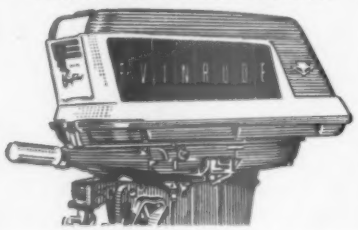

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vestigation and interpretation of the seismic method of prospecting. According to the maker, experience has shown that the Acoustilog is one of the most useful logs in evaluating porosity in massive sandstones and carbonate formations.

During the logging operation, the tool repeatedly generates a sharp, high-intensity sound. This sound passes through the formation and is picked up by sensitive detectors carried in the tool. A measurement is made of the time interval between the arrival of each pulse at the nearest and the more remote detectors. This interval time, a measure of the time required for sound to travel the fixed distance between the receivers through the formation, is recorded on the log. The log deflection also carries an acoustic velocity scale since the interval time recorded is reciprocally related to the velocity of sound in the formation. Source: **Lane-Wells Co., Box 1407, Houston 3.**

•

Accurate samples

. . . from clays, soft rock, and friable shales is possible with this Pitcher sampler, the maker claims. Drilling fluid cannot erode or contaminate the sample even in soft overburden or water-sensitive formations, according to the maker. A spring-seated shelby tube telescopes into the outer barrel as the cutters core harder formations to eliminate excessive pressures and prevent tube damage. A sliding valve directs drilling fluid through the tube to the hole bottom for a flushing action. Source: **Mobile Drilling, Inc., 960 N. Pennsylvania, Indianapolis 4.**

•

Valve

. . . with Teflon body seat recently developed is a 6-in. full-round-opening, bolted-bonnet type in which the Teflon body seat is contained in a metal insert. The valve comes in both ASA 300 and 600-lb. ratings and with raised-face or ring-joint flanges.

Uses for the valve, according to the maker, include industrial gases, hydrogen, nitrogen, ammonia, natural-gas-gathering systems, hydrocarbon-storage installations, and processing plants.

Features include low opening and

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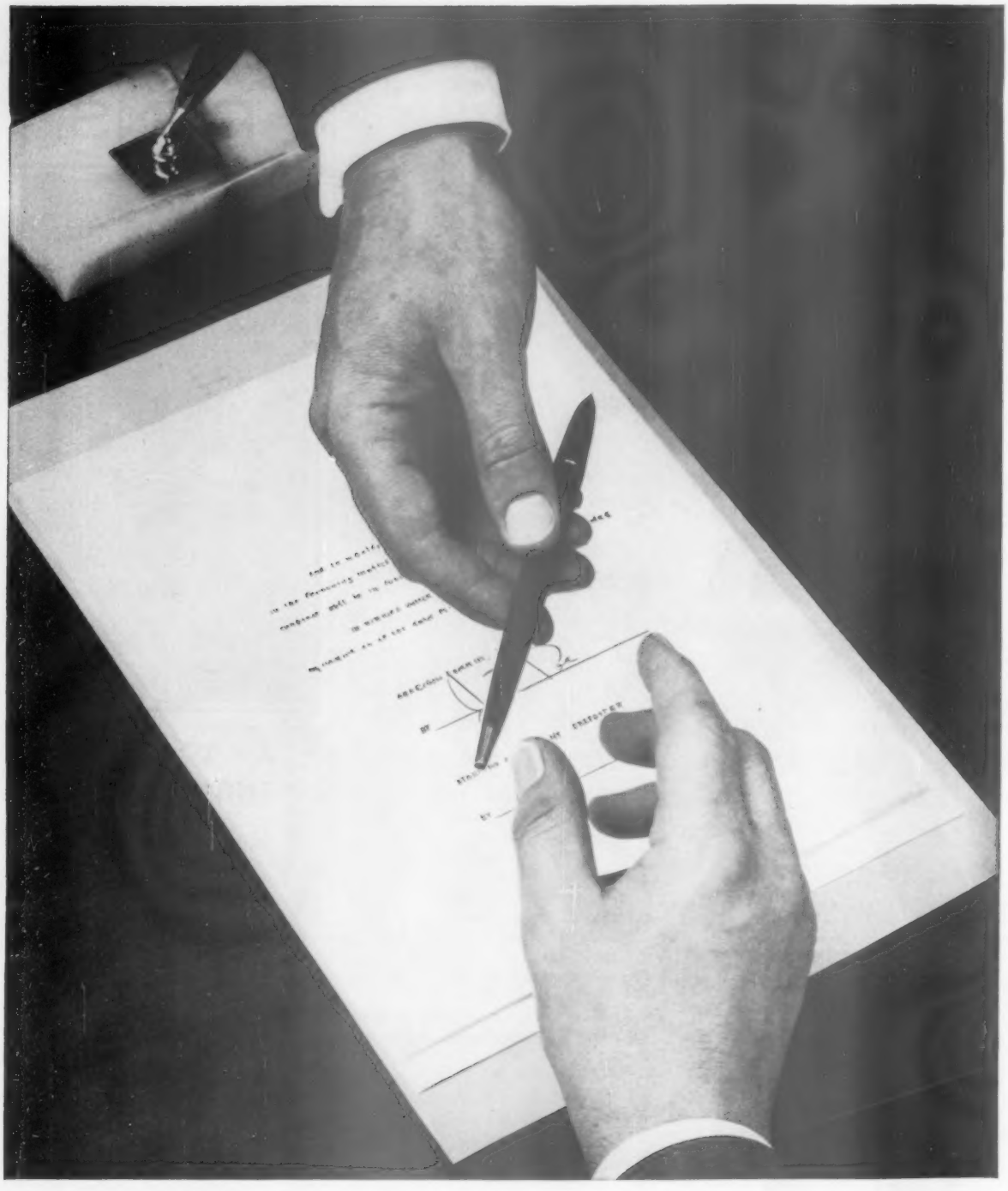

"Respect for contracts is a fundamental element of civilized life. Unless such respect is firmly established as a moral and legal rule, the economic stability and peaceful progress of the entire free world are inevitably hampered."

—M. J. Rathbone, President

Standard Oil Company (New Jersey)

closing torque. The valve is a non-lubricated type. Source: **Orbit Valve Co., Box 699, Tulsa.**

•

Oil-well pump plunger

. . . has been developed to provide an inexpensive, positive-seal, metal-to-metal pump for normal pumping conditions when extreme sand is not a factor. According to the manufacturer, best results have been obtained in relatively high-gravity fluid, and most comparative runs have been against cup type or fabric-ring type of plungers.

The rings are made of alloyed cast iron. The maker recommends the plunger to be run in any type of precision-honed steel barrel, regular, hardened, or chromium-plated. The 12-ring plunger is recommended for wells to 3,000 ft. pump depth, and the 16-ring plunger for deeper wells.

The piston-ring plunger has standard API pin-end threads. Worn plungers are renewed by changing the carrier and piston-ring assembly. The maker claims the accurately machined plunger tube, spacers, and carriers allow fast assembly, with no alignment tools being required. Source: **Monarch Engineering Corp., Box 108, Gardena, Calif.**

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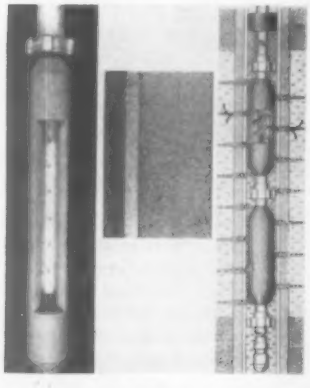
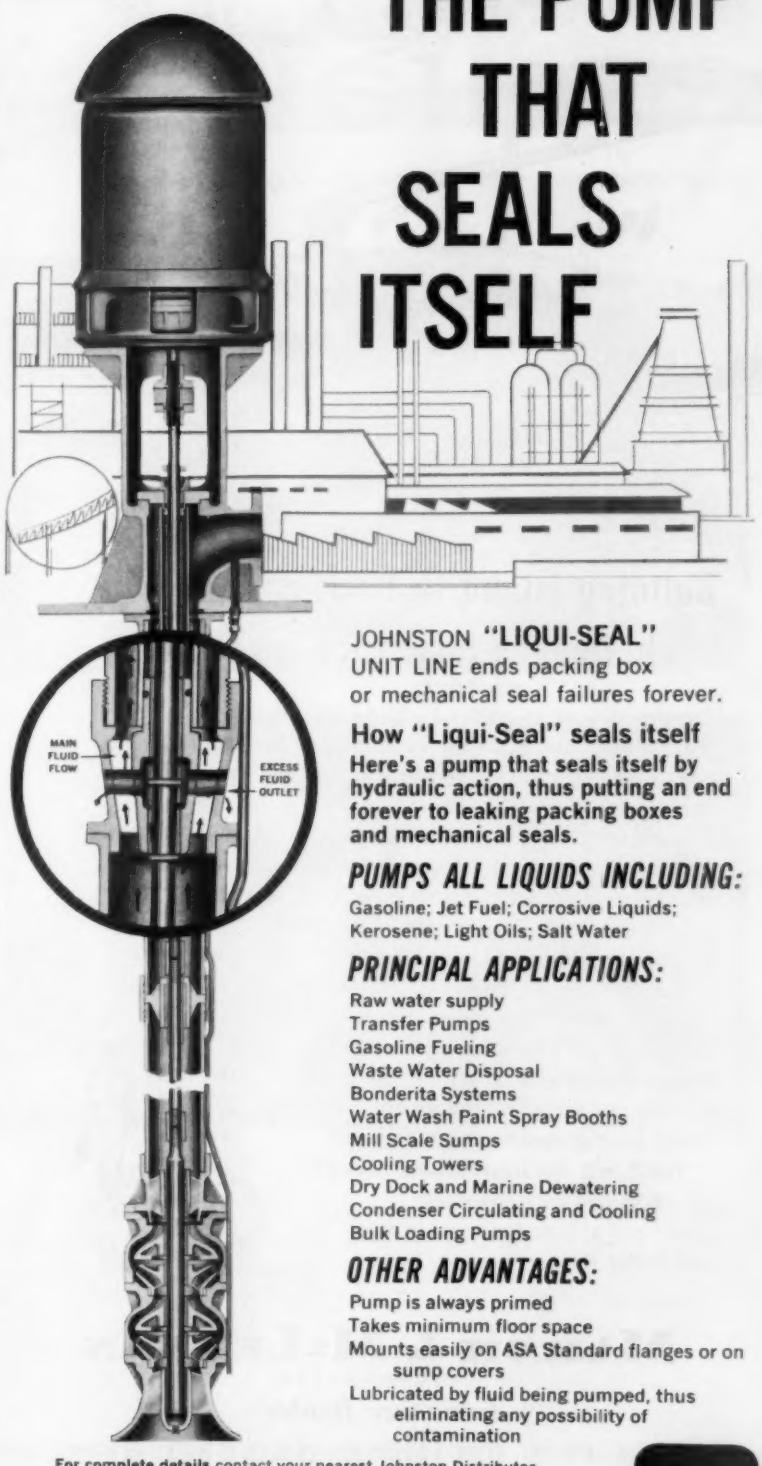


Sand control

. . . development is this sand screen with the outer area covered with sand. The preformed screen is essentially an outer cylinder of sand, bonded together and held in place by a thermosetting resin, around standard perforated or slotted tubing.

The screen uses a sand face as the direct screening medium, without an outer covering of metal. The con-

THE PUMP THAT SEALS ITSELF



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Here's a pump that seals itself by hydraulic action, thus putting an end forever to leaking packing boxes and mechanical seals.

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It is through risk appraisal, engineering, and negotiation of insurance contracts that we achieve broadest protection for our clients at the lowest cost commensurate with safety. In the event of loss, our services continue to insure prompt and equitable payment.

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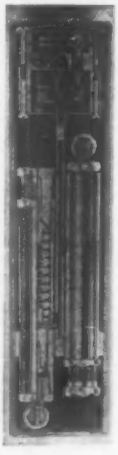
solidated sand mixture in the screen has a compressive strength exceeding 3,000 psi. The screen comes in a 6-ft. length with either a 3.9 or a 5.75-in. o.d. Each 6-ft. length is equipped with a centralizer and collar. Source: **Halliburton Co., Drawer 1431, Duncan, Okla.**

•

Pressure-control pilot



. . . called the Type E-1, now available has separate high and low-pressure-sensing elements to allow pressure to be taken from two separate points. The control can serve as a pressure safety control and as a high-low shutoff. Additionally, it can be used as a well purger and for back-pressure and pressure-reducer service. A pressure range of 0 to 2,000 psi. is available through the use of interchangeable pressure-range springs.

Control features includes: snap-action, pressure-balanced diaphragms, resilient large-area seat, nonbleed pilot, and overrange protection for pilot section. Measuring 12 by 3¼ by 3½ in., the control mounts on the side of the motor valve. Source: **Merla Tool Corp., Box 2576, Dallas.**

•

Circulating packer

. . . now being produced is a hook-wall type with a built-in sleeve valve. The valve on the VP packer permits circulation of the fluid in the casing annulus when the packer is set, according to the maker.

The valve is opened and closed with wire-line tools. When it is in the open position, circulation is made in either direction through the inside of the packer element.

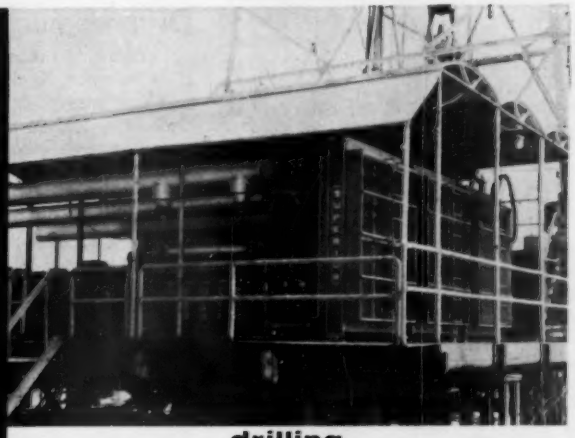
The packer can be set by conventional top-hole manipulation and by applying a portion of the tubing weight to compress the packing element. According to the maker, the packer is readily adaptable to such permanent completion practices as perforating the casing below the tubing string and running a retrievable tubing extension to provide circulation to the bottom. It comes in most popular casing and tubing sizes. Source: **Page Oil Tools, Inc., Box 7097, Long Beach 7, Calif.**

highest dependability...
lowest operating costs...

Superior ENGINES

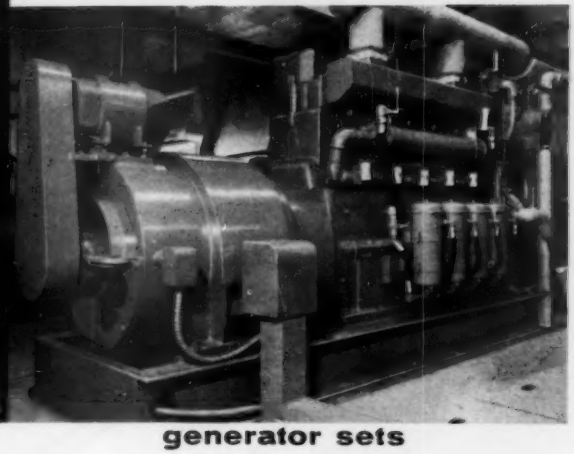
for every oil field power requirement

waterflooding



drilling

compressors



generator sets

You are assured trouble-free, profit-boosting performance at lowest operating costs with White's Superior engines. Throughout the gas and oil fields, these precision-built, heavy-duty, high quality engines dependably power waterflood repressuring plants; mechanical and electro-mechanical drilling rigs; gas gathering and booster compressors; and auxiliary power generators. Available in 6 or 8 cylinder, naturally aspirated or supercharged, diesel, dual-fuel and gas engines from 190 to 2150 B.H.P.; and in 150 to 1500 KW generator sets. Get complete information at offices listed below.

Superior ENGINES · ATLAS Imperial DIESEL ENGINES · White DIESEL

WHITE DIESEL ENGINE DIVISION

THE WHITE MOTOR COMPANY • *Plant and General Offices: Springfield, Ohio*

Sales and Service Points: Ketchikan, Alaska; Terminal Island, California; Denver, Colorado; Washington, D.C.; Clearwater, Florida; Chicago, Illinois; Wichita, Kansas; New Orleans, Louisiana, Squantum-Quincy, Massachusetts; Park Rapids, Minnesota; Webster Groves, Missouri; Callaway, Nebraska; New York, New York; Springfield, Ohio; Tulsa, Oklahoma; Portland, Oregon; Wynnewood, Pennsylvania; Ft. Worth, Houston, Texas; Seattle, Washington. Canada· Calgary, Alberta; Vancouver, B.C.; Halifax, N.S.

SHOWCASE . . .

New Literature

Belt-drives

. . . publication recently issued, gives step-by-step instructions for drive selection with tables of service factors and horsepowers; dimensions and weights of 182 stock and 54 made-to-order Hi-Cap Wedge QD sheave sizes with diameters ranging from 2.65 to 71 in.; specifications of QD bushings, bores, and keyways; drive installation and removal instructions. Source: **Fort Worth Steel & Machinery Co., 3600 McCart St., Fort Worth 10.**

Subsurface flowmeter

. . . and surveys equipment for positive reservoir control, are featured in a new 20-page catalog just issued. Illustrated are flow profiles of five wells in a multizone reservoir along with profiles of three typical injection wells. Source: **Udell, Inc., P. O. Box 671, Longview, Tex.**

Testing-instruments

. . . Catalog 60 offers detailed specifications, charts, photos, and graphs of a variety of testing equipment for the oil and gas industry. Products described include a critical-flow prover, deadweight testers and accessories, recorders, recording gas gravitometer, gravity balances, LP-gas testers, mercury purifier, oil sampler, orifice well testers, porosimeters, pulsameters, pycnometers, and thermometers. Source: **Chandler Engineering Co., 320 S. Kenosha, Tulsa.**

Drilling-mud

. . . chemicals discussed in a new 28-page brochure include weighting material, bentonites, salt-water clays, water-loss control additives, lost-circulation materials, and phosphate thinners. The free publication is complete with charts, and data on characteristics, use, packing, yield, and qualities. Source: **CECA & Associates, 175 Piccadilly, London W1, England.**

Portable cables

. . . for the petroleum industry, which contain a high percentage of neoprene, are outlined in a new obtainable six-page folder. Photographs depict different types of cable available. Included are two pages of specifications showing sizes, insulation thickness, outside diameter, package size, shipping weight, and current-carrying capacity. Source: **Western Insulated Wire Co., E. 30th St. at Santa Fe, Los Angeles 58.**

Shutters

. . . for stationary engines and trucks increase engine efficiency and decrease operating costs, as reported in a four-page bulletin available now. It tells how the shutter is automatically adjusted by a thermometer, which gives absolute temperature control to within 2° F. Source: **Dunlap Mfg. Co., P. O. Box 15-668, Tulsa.**

Grounds-maintenance

. . . equipment is described in a new 16-page publication which places emphases on mowing, snow removal, and ground preparation. Action pictures show the equipment in use at several different jobs. Source: **Gravely Tractors, Div. of Studebaker-Packard Corp., Dunbar, W. Va.**

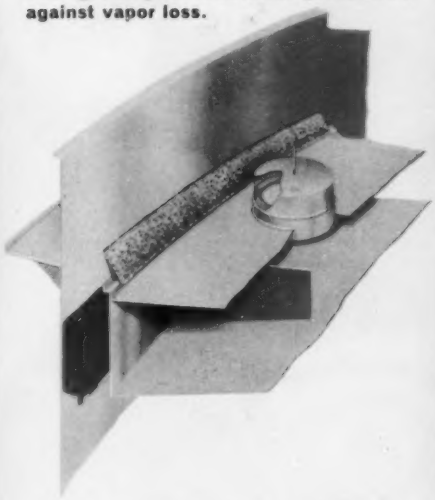
Liquid-level gages

. . . and valves catalog (eight pages) offers a condensed presentation of the more pertinent data and specifications.

ROWCO BRUSHKING
SPEEDS PIPE LINE MAINTENANCE
NEW MODEL 660 does the work of 6 men
The new Brushking Model 660 — now 50% more powerful with 3 H.P. throughout — keeps lines clear . . . keeps maintenance costs down. Slashes through brush and trees up to 9" dia. Trims overhead or reaches into ditches. Cuts close to posts, fences, walls. With grass trimming attachment, clears heavy grass and weeds. Guaranteed shatterproof blade — complete operator safety.
Thousands in use. Write for free literature and name of your nearest distributor.
ROWCO MFG. CO., INC.
DEPT. J2, 48 EMERALD ST., KEENE, N.H.
BRUSHKING 660

SEALED TO PROTECT

This self-adjusting Graver-engineered seal gives you maximum protection against vapor loss.



The Graver Pressure Seal, filled with gas or air, can expand to fill a varying 3″ to 14″ gap between the roof and the shell of a floating roof tank. Provides a better sustained contact against the shell than any solid or liquid pressure type seal.

Even, positive pressure without binding is maintained, despite weather and temperature variations, through the use of an expansion chamber. And since only an ounce of pressure is necessary, wear on the sturdy fabric is at a minimum.

Depend, too, on the Graver Pressure Seal to eliminate vapor space above the liquid, to reduce fire hazard and to seal out dirt, rain and snow. Centering rollers drain off static electricity. And because of the tube's flexibility, the roof can travel freely, even over projections, without breaking the seal.

This Graver Pressure Seal, in service in this country and overseas since 1957, is another example of Graver engineering and Graver research serving you.

Graver

DIVISION—UNION TANK CAR COMPANY

Graver Tank & Mfg. Co.

EAST CHICAGO, INDIANA

PLANTS AND OFFICES ACROSS AMERICA

Condor LS V-Belts have 40% greater power capacity formerly available only in a *premium* V-belt construction . . . *without* the premium price!

R/M OILFIELD PRODUCTS GIVE YOU MORE USE PER DOLLAR

Condor LS* V-Belts *Come Matched– Stay Matched on the Drive!*

*LENGTH STABILIZED . . . top to bottom, *every* part of a Condor LS V-Belt is engineered to minimize stretch, eliminate belt whip, undue stress or belt turnover on long center, heavy duty oilfield drives! They give a degree of lateral and longitudinal stability never before possible. A set of matched Condor LS V-Belts *stays* matched to outperform and outlast any other belt under the heaviest loads.

- **Balanced-Built "Stabilizing" Section**
- **Accurately Positioned Belt Strength Members**
- **Length Stability *without* Stretch**
- **Smoother, Cooler Running**
- **Packaged for Protection and Convenience**

Each belt is factory measured, length certified and tagged. They come matched and stay matched! Write for Bulletin M210.

R/M POLY-V® DRIVES

More Power in Less Space ... with Reliability

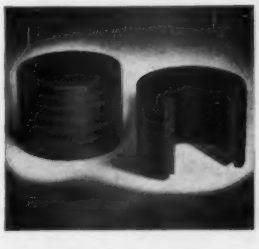
No other drive puts as much extra push in deep hole drilling as the exclusive, patented R/M Poly-V! Delivers much more power than a V-drive of equal width...or equal power in much less width. Single unit belt design eliminates belt matching problems in the field . . . reduces field inventories. Just *two* belt cross sections meet every heavy duty drive requirement. Maintains groove shape, complete contact pressure. Write for Poly-V Drive Bulletin M141.

Convert to Poly-V and be SURE!

RAY-MAN ROTARY HOSE

Strong • Safe • Flexible

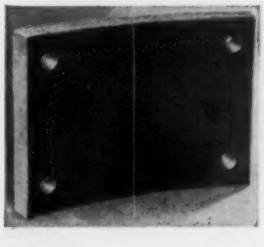
Special high-tensile steel cable wire reinforcement, precision wound under tension, gives Ray-Man CBL Rotary Hose unequalled strength and flexibility for safer, easier handling and make-up on the rig. Resists kinking and accidental crushing in transport . . . holds steadier in the derrick *without whipping*—even under high pressures of deep drilling. Streamlined, built-in coupling has no protruding lugs or flanges—features R/M leak-proof "Lip-Lok" seal that tightens under pressure to prevent blowouts! Write for Oilfield Hose Bulletin M651.



R/M VEE-SQUARE® PACKINGS

Extra Reliability for Mud Pumps

Depend on R/M Vee-Square Packings for extra reliability. Nonyielding, they can take tight gland pressures, require no sensitive gland adjustments. Blow-by is prevented by soft rubber cushions between the rings, and they seal automatically. Each ring in a set acts individually during normal life. Pressure does not pyramid through the set. An R/M Vee-Square cannot ride the rod. R/M Vee-Square Packing is manufactured for all types and sizes of oilfield mud pumps. Write for the Hydraulic Packings booklet.



RAY-MAN BRAKE BLOCKS

Make Hole Faster

Long lasting Ray-Man 635-D Brake Blocks cost less because they wear longer. Made of extra-large asbestos yarns, special saturant, wire reinforced. Resist bleeding, won't glaze or carbonize. Ray-Man Blocks are available in drilled or countersunk sets or in the R/M patented Key-Lok style. Make hole faster. Cut cost with Ray-Man. Call your nearest R/M warehouse today or contact your closest authorized R/M oilfield equipment supply store—there is one located in every major oil producing area.

RAYBESTOS-MANHATTAN, INC.

PASSAIC, NEW JERSEY

Brake Linings and Blocks • Clutch Facings and Automatic Transmission Friction Parts • Conveyor and Power Transmission Belts Industrial Hose • Rubber Covered and Lined Equipment • Mechanical Packings and Gasket Materials • Asbestos Textiles • Engineered Plastics • Sintered Metal Products • Abrasive and Diamond Wheels • Industrial Adhesives • Laundry Pads and Covers • Bowling Balls

New ELDER
"Knock-Down"
Field Housing Units

Save up to 80% on shipping costs!

Shipping costs drop, handling speeds up with Elder's "Knock-Down" units. Now you can ship field housing overseas or move complete camps to new locations at one-fifth the cost!

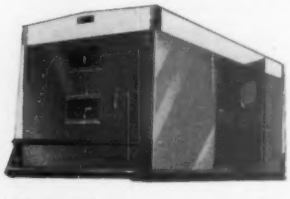
"Knock-Down" units are quickly erected with a minimum of labor. Side walls, mounted on continuous hinges, simply raise into place. End walls are bolted into side walls and frame. Fiberglass roof is one-piece construction.

Elder designs and builds all types of mobile housing for field crews.

Knock-down unit ready for setting up.

Side walls go up first.

End walls and roof are locked securely into place.



Unit erected.

Eight knocked-down units loaded and ready for shipment.

ELDER TRAILER AND BODY, INC.
DENVER PLANT: 4830 Race Street, Phone AMherst 6-1781
HOUSTON PLANT: 4510 Navigation Blvd. Phone WAlnut 6-8335

Catalog 376 covers conventional and special-function gages and valves, and includes dimensional drawings, photos, construction features, pressure - temperature graphs and ratings, materials, and a table of size, specifications, and maker's standard and optional features. Source: **Jerguson Gage & Valve Co., 80 Adams St., Burlington, Mass.**

Marine-seismic operations booklet

. . . describes facilities for conducting single-ship operations. The six-page literature piece details GSI's 405-ton motor vessel Sonic and the Texin, a 420-ton vessel. The Texin is 174 ft. long and the Sonic's length is 158 ft. However, both vessels have a loaded draft of only 6 ft., and through the use of auxiliary launches equipped with seismic instruments, they can work in any water depth. Source: **Geophysical Service, Inc., Marketing Department, 900 Exchange Bank Bldg., Dallas 35.**

Controlled-solubility phosphate

. . . Formula 1-R, developed especially to prevent the formation of "gyp" in oil-field operations, is the subject of a new bulletin just issued. It contains detailed information as to composition, application, advantages, and recommended treatment, along with data on price, packaging, and shipping. Source: **Hagan Chemicals & Controls, Inc., Hagan Center, Pittsburgh 30.**

Industrial-fan

. . . Bulletin IF-100 devotes some 17 pages to pertinent engineering data on industrial exhausting, flowing, and drying. An engineering handbook section includes air-volume tables, corrosion data, drying temperatures for a variety of processing requirements, piping information, and many of the engineering facts needed for a mechanically sound exhaust and blower system. Source: **General Blower Co., Morton Grove, Ill.**

Adhesives and coatings

. . . for insulation applications are outlined in new four-page Bulletin ICA, obtainable free for the asking. It also describes a simplified method of selecting the right product for insulation jobs, and lists typical applications for the most widely used adhesive products. Source: **Insul-Coustic Corp., 42-23 54 Rd., Maspeth 78, N. Y.**

NOW WITH
POLARIZED
ADDITIVE
Greater "Clinging" Power for Increased Thread Protection!

Jimmie Gray®
"500 TON"

Used on more wells throughout world-wide drilling industry!

SOLD ONLY THROUGH SUPPLY STORES

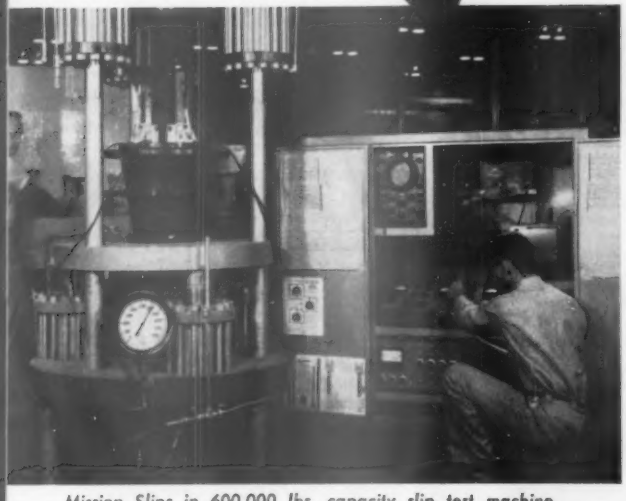
MONEY BACK GUARANTEE

USE JIMMY GRAY DOPE BRUSHES

PETROLEUM DISTRIBUTING CO.
BOX 203—HOUSTON, TEXAS—CApitol 4-9648

MISSION LIGHTWEIGHT SLIPS BUILT LIKE A BRIDGE FOR STRENGTH AND LIGHTNESS

MODEL 60



Mission Slips in 600,000 lbs. capacity slip test machine, with fourteen channel recording oscillograph measuring strains in slips and pipe.

Field and laboratory tests proved that these slips are built like a bridge with plenty of strength but no excess weight. They weigh only 135 pounds; so you won't break your back setting them. Yet, they have all the heavy-duty features you will ever need. You can hold drill pipe with hook loads of 275,000 lb. and drill pipe sizes 2⅜" through 5". The lightweight results from a new design based on sound and proved engineering principles.

Mission Rolling Dog teeth grip the hardest pipe available today with minimum stress concentration. New positive lock retains dogs in place. The standard rolling dogs and new solid inserts let these slips do the job of the heavyweights. You will find all the proved and popular Mission slip features: Segments are self-leveling as insurance against crimping the pipe. Top of slips is constructed to allow heavy elevator blows to be absorbed. Renewable hinge pins on these Lightweight Slips mean long life, less replacement. Flexible handles bend instead of break.

These new slips — built like a bridge — are one more proof Mission knows drilling problems and knows how to overcome them. Available at your supply store.

For over thirty years - quality built in to last **MISSION** MANUFACTURING CO

MISSION MANUFACTURING CO., P. O. Box 4209, Houston, Texas
Cable Address—"Missco" • Export Office: 30 Rockefeller Plaza, New York
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1 Hanover Square, London W. 1 England • Cable Address—"Missoman"

Pistons • Piston Rods • Slips • Gland Packings • Liners • Liner Packing • Pump Valves and Seats • Swabs • Valves • Hammerdrils • Centrifugal Pumps

Equipment Men Notes

United Supply & Mfg. Co. opens

... two new Oklahoma stores at Hennessey and at Woodward. The Hennessey facility is managed by Oran Loyd. C. B. Croson is field salesman. The Woodward store is headed by George Brown. H. W. (Hoob) Jones is field salesman there.

Loyd was transferred from Velma to Hennessey, and Brown from Atwood, Kans. to Woodward. B. D. Bunn has been promoted to store manager at Atwood. The two stores are operating under the direction of M. W. Brown, Oklahoma City district manager.

K. W. Anderson Co. purchased

... by Yuba Consolidated Industries, Inc. The Anderson company manufactures high-temperature furnaces for processing industries. The firm will be consolidated with Yuba's Petro-Chem Development Division.

Kenneth W. Anderson, former president of the company, will be vice president and general manager of the consolidated division. The Anderson facility is located on a 4½-acre site in Tulsa.

Continental-Emsco Co. makes

Godfrey Cajthaml

... several promotions and a transfer. Godfrey Cajthaml, former store manager at Edmonton, Alta., has been promoted to manager of C-E's newly established Calgary, Alta. district.

Reinaldo C. Gonzales, former sales engineer at Anaco, Venezuela, is now store manager at the same location. Carl R. Hopper has been boosted to D+B specialist at Hobbs, N. M. He previously was a D+B specialist trainee.

Paul J. McKinzie and Jack D. Rhodes are new pump shop foremen. McKinzie is located at Duncan, Okla., and Rhodes at Monahans, Tex. Bobby J. Peery, district D+B specialist, has been transferred from Salem, Ill. to Evansville, Ind.

J&L Supply Division assigns

... R. L. Spenst, salesman at Estevan, Sask., to Drayton Valley, Alta., where he will serve in the same capacity. Other assignments involve W. B. McClelland, salesman at Drayton Valley, shifted to Fort St. John, B. C., and B. J. Ford, store manager at Pampa, Tex., named salesman there.

In other J&L moves, R. C. Dean has been promoted from storeman at Estevan to store manager at Fort St. John; B. J. Gough, salesman at Pampa, now store manager there; J. C. Smith, former store manager at Ballinger, Tex., transferred to Anson, Tex. in the same capacity; and C. H. Sala, Jr., store manager at Anson, now assigned as store manager at McPherson, Kans.

C. Freeman appointed manager

... of advertising and sales promotion of Worthington Corp., announces T. J. Kehane, vice president of marketing. Freeman replaces M. E. Ziegenhagen who resigned.

C. Freeman

Freeman had been account manager for the company's engineered products divisions since 1955. He joined Worthington in 1953 to initiate a line of technical external publications, and was appointed account supervisor for the Compressor & Engine and Steam Turbine Divisions in 1954.

TEST WELL located adjacent to Bowen Itco, Inc.'s warehouse in Houston, simulates almost any down-hole well condition. The large diameter of the well bore and protection casing permits the running and recovery of various sizes of production casing. Under these conditions down-hole tools or equipment may be operated under actual field well conditions, then recovered for study and evaluation.

Reed Roller Bit Co. names

... Robert L. (Bob) Walker as staff engineer, in which post he will be primarily responsible for the coordination of engineering efforts with sales. The announcement comes from Chief Engineer George Gilbert. Prior to joining Reed, Walker was division production superintendent for Shell Oil Co. in East Texas. During his 12½ years with that firm, he spent some time as a drilling engineer in The Hague, The Netherlands.

R. L. Walker

Exner-Dodge, Inc. expands

... its sales organization with the appointment of Dean D. Collins as district representative at Shreveport, according to Clyde H. Chronister, sales manager for the Coffeyville, Kans. firm. Collins will cover a territory including Northern Louisiana, Mississippi, Arkansas, and East Texas.

He will also operate a warehouse in Shreveport which will be used as a distribution point for Exner-Dodge products. A veteran of 28 years in the oil and gas industry, Collins was previously district manager for Rockwell Mfg. Co. in the Shreveport area.

Guy E. Lewis is appointed

... assistant district engineer — machinery and equipment sales and service, at Ventura, Calif. for Oil Well Supply Division of U. S. Steel Corp. The announcement comes from D. S. Grubbs, the division's California area manager.

Lewis was employed by Oilwell in 1947 at Los Angeles. He was appointed field engineer there in 1950 and retained this post on being transferred to Ventura 3 years later. He was sent from Ventura back to Los Angeles in 1959 and became assistant district engineer—machinery and equipment sales.

Tyson Smith Co. reports opening

... of a district location in Laurel, Miss., with warehouse and office facilities to stock, distribute, and service oil and gas process equipment. District manager at the new location will be C. D. McDonald.

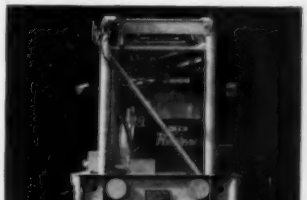
McDonald's oil-field equipment and service experience dates back to 1940. He has been with Halliburton Oil Well Service Co., Sparton Tool & Service,

PROFITS? ask the owner of an Ideco Drive-In!

An Ideco Drive-In Rambler will increase your profits too! Because Drive-Ins are faster to the job and faster on the job. Drive-In Ramblers are Ideco's answer to the need for faster, more economical servicing, workover, and shallow to medium-depth drilling equipment.

Six Drive-In models, ranging from 114 to 395 horsepower, are now available for every job from pulling rods to "slim-hole" drilling. One engine, one torque converter and one transmission provide power for both roading and rig operation.

"Drive-In" to your next location with an Ideco Drive-In. Ask your Ideco man for full details.



QUICK RIG-UP . . faster raising and drive-in to hole assure minimum downtime.

Increased Profits for You . . . Engineered by Ideco

IDECO

P. O. BOX 1331
DALLAS, TEXAS

ONE OF THE DRESSER INDUSTRIES

DRESSER
INDUSTRIES, INC.
OIL • GAS • CHEMICAL • ELECTRONIC • INDUSTRIAL

You save drilling dollars with

THE

MUD PROBLEM: Maintaining a stable lime mud at high temperature.

WELL DATA

Location: San Salvador Field, Hidalgo County, Texas
Total Depth: 16,684'
Bottom Hole Temperature: 356°F

MUD ADDITIVE PROGRAM

0' to 4000'	Native mud plus AQUAGEL*
4000' to 5800'	AQUAGEL, BAROFOS*, TANNEX* and caustic soda
5800'	Converted to lime treated emulsion mud
5800' to 9000'	CARBONOX*, lime, TANNEX, Caustic soda, IMPERMEX*, diesel oil
9000' to 16,684'	CARBONOX (up to 20 lb/bbl of mud), caustic soda, lime, diesel oil; and MICATEX* and TUF-PLUG† in quantities from 10 to 30 lb/bbl of mud BAROID* was added as neccessary to control mud weight

TYPICAL MUD PROPERTIES

Depth	5850	7340	9229	12,057	14,918	16,684
Weight, ppg	10.2	12.2	15.5	17.3	18.0	19.1
Ave. sp gr, Solids	3.0	3.7	3.8	4.0	4.1	4.2
Viscosity, sec. API	43	44	54	63	78	58
Stormer Gel, 10 min	5	10	10	10	5	5
Filtrate, cc API	9.0	5.6	1.7	1.4	0.7	2.5
pH	11.8	11.5	12.0	12.5	12.5	12.4
Oil, %	10.0	10.0	12.0	11.0	10.0	9.0
Lime, excess ppb	1¼	1½	1	2	2½	1

CASING PROGRAM

Size Inches O.D.	*Depth Set Feet*
20	159
13⅜	2002
9⅝	8942
7	14921
5 (liner)	15960
3½ (liner)	16684

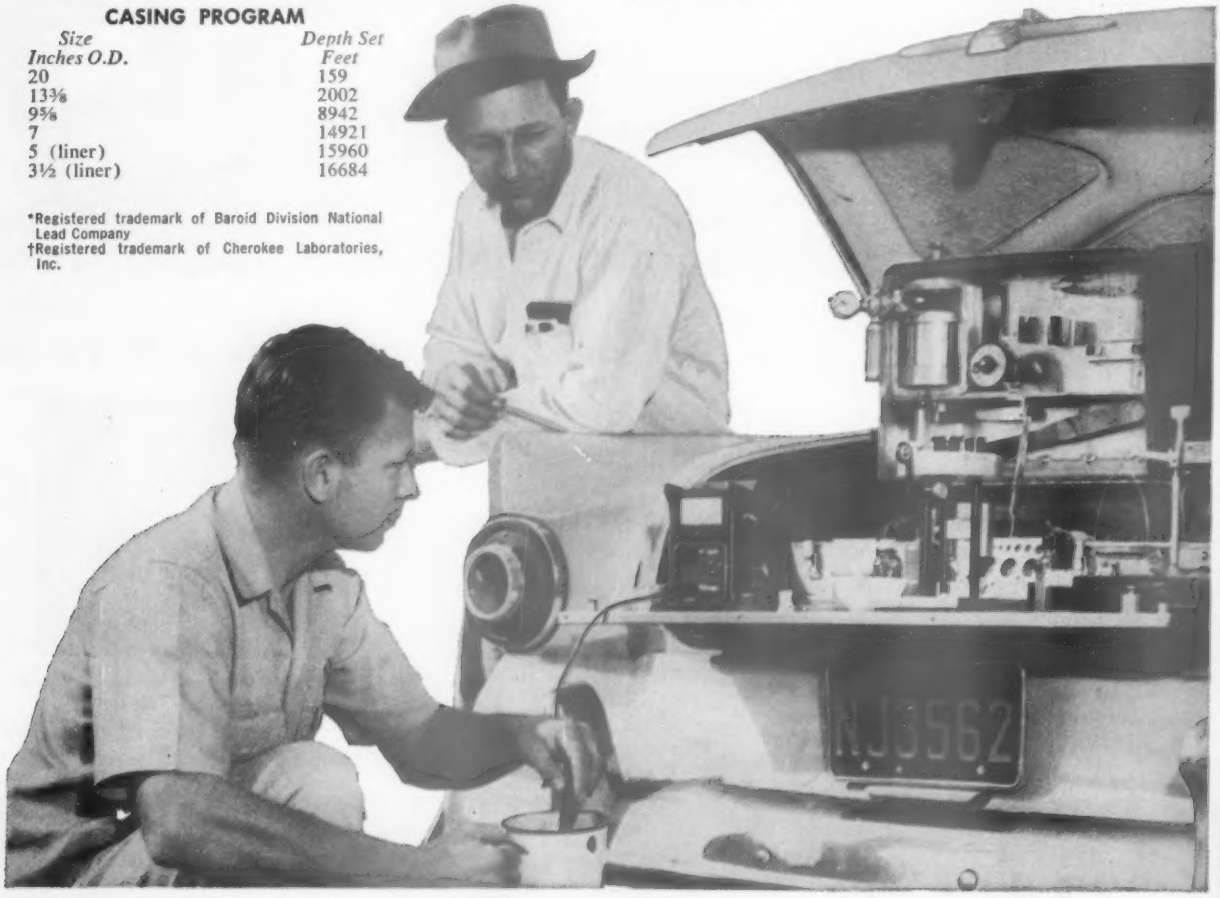
*Registered trademark of Baroid Division National Lead Company
†Registered trademark of Cherokee Laboratories, Inc.

PROBLEM: To maintain mud property stability at 356°F.

DISCUSSION: The problem of prevention of high temperature gelation, maintenance of desirable viscosity and filtration, and prevention of mud loss to formations became greater with increasing depth, mud weight and decreasing hole size. Additives used had to be compatible with all other materials in the mud and not adversely affect any other mud property.

SOLUTION: The best mud treatment was determined by conventional mud testing plus tests of treated samples aged at 25°F to 50°F above anticipated bottom hole temperatures. CARBONOX proved to be the best thinner for controlling high temperature gelation and viscosity and the most efficient additive for controlling filtration and filter cake thickness.

The Baroid Mud Centrifuge was used to separate and discard low specific gravity solids and reclaim 85 to 92% of the BAROID in the treated mud. The Mud Centrifuge helped achieve a reduction in mud maintenance cost of approximately 25%.



a Baroid Mud Program

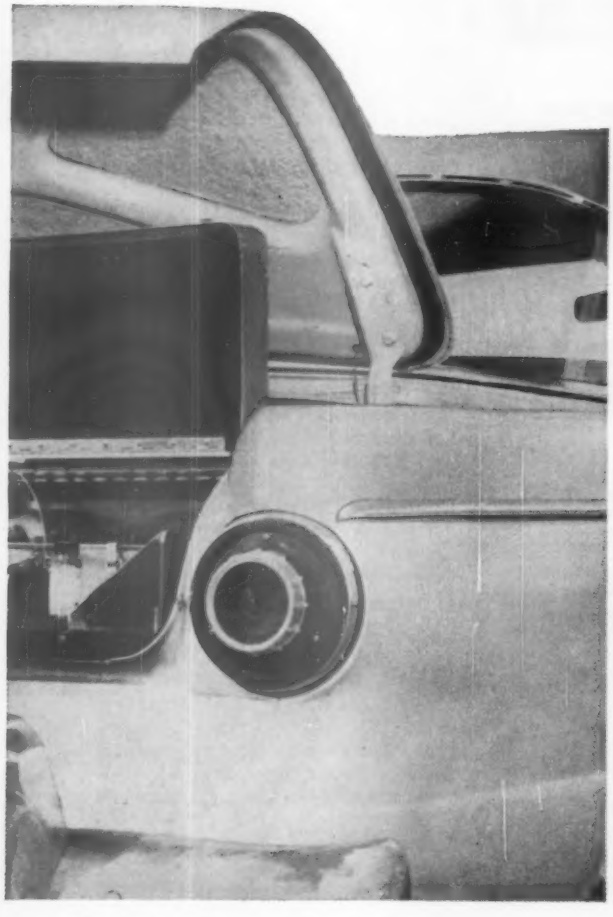
MUD PROBLEM

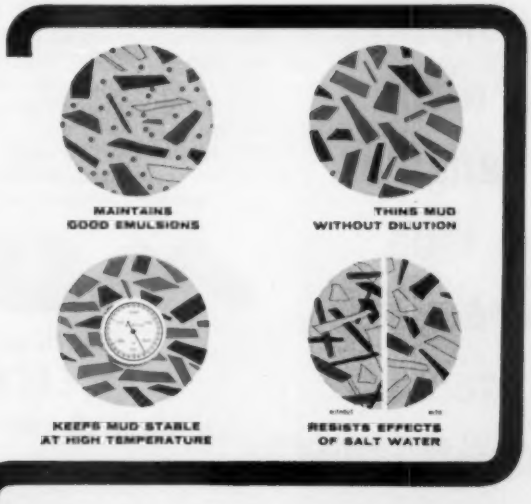
... and its solution

This case history shows how a complete Baroid mud program gives you successful mud control under the most adverse conditions. In this instance problems included depth to 16,684 feet, bottom hole temperatures up to 356°F, mud weight up to 19.1 lb/gal, salt contamination and lost circulation.

Baroid engineered services and products, coordinated with a pilot-tested program, enabled operating crews to maintain a lime-treated oil emulsion mud that was always as thin as needed . . . that did not gel excessively at high temperature . . . that had low filtrate loss . . . and that cut mud costs by 25%.

Baroid's improved new concept of modern marketing methods gives you an integrated mud service assuring quality control of products, engineering accuracy and technical ability that combine to save *your* drilling dollars.




MAINTAINS GOOD EMULSIONS
THINS MUD WITHOUT DILUTION
KEEPS MUD STABLE AT HIGH TEMPERATURE
RESISTS EFFECTS OF SALT WATER

BAROID

BAROID DIVISION NATIONAL LEAD COMPANY

MAIN OFFICE: P. O. BOX 1675, HOUSTON 1, TEXAS

BAROID

6007

Rector Well Equipment Co., and Welex Jet Service. He has been self-employed since 1955.

Two European firms licensed

... by Grove Valve & Regulator Co., Oakland, Calif., to produce its G-4 gate valve, used to control flow of natural gas and petroleum in pipelines.

New licensees are Nuovo Pignone, of Firenze, Italy, and Robert Cort & Son, Ltd., Reading, England. Grove's French subsidiary, Grove France S.A., in Paris, has been producing the valves since early in 1958.

Leasing plan is introduced

... by Perkin-Elmer Corp.'s Instrument Division, whereby users may lease chemical analytical instrumentation. The plan has been arranged with Horton Equipment Leasing Division of Advance Industries, Inc., Cambridge, Mass.

Under the plan, instrument users may lease P-E instruments at a monthly rate for each thousand dollars of the equipment's purchase price. At the end of an initial 3-year rental period, the user may renew the lease, or purchase the instrument at a percentage of its original cost.

When a lease has been executed, Horton will purchase instruments specified by the user from P-E, and will direct shipments to the users' site.

Delta Tank Mfg. Co. appoints

S. H. Landes

... Spencer H. Landes and James I. Montgomery to its Dryex Division, reports B. W. Bourne, vice president and western regional operations manager. Landes, who joined Delta earlier this year, will manage the Dryex Division in Houston, and Montgomery will serve as assistant manager.

Landes has served as process engineer and research chemist with petroleum firms, and as an instructor at Oklahoma State University while doing graduate work. Montgomery formerly served with an engineering consulting firm, and in the writing, coordination, and design departments of an oil company.

Charles W. Ganzel is manager

... of pipe and tube sales of Bethlehem Steel Co., according to Jesse V. Honeycutt, vice president of sales. Ganzel, manager of sales for Bethlehem's Cleveland district since 1956, succeeds Edwin A. Buxton, retiring after more than 43 years with the company.

Frederick W. West, Jr., assistant manager, plate sales division, will succeed Ganzel at Cleveland. William E. Hotaling, of the company's New Haven, Conn. sub-office, will take West's place.

Oil Well Supply Division names

... a new assistant district engineer and three field representatives, according to M. F. Jones, Gulf Coast area manager of the division of U. S. Steel Corp. L. H. Shaw, Jr. becomes assistant district engineer at New Orleans.

Newly appointed field representatives are Oscar W. Mykleby, Brookhaven, Miss.; and Wilburn D. Lakey and Jimmy C. Mills, Laurel, Miss.

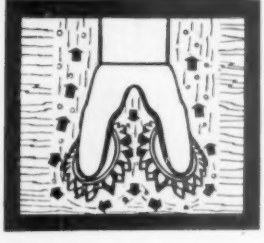
Welex, Inc. reports promotion

... of three men to district-manager posts.

In New Orleans former Venezuela Manager James Magee was named district manager—offshore, and named as his assistant was Owen Townley, former assistant district manager at Snyder, Tex. J. T. Moran, former assistant district manager at Lafayette,

CECA

supply a full range of mud chemicals for all conditions



The selection of chemically controlled muds

The manufacturers of CLARSOL drilling bentonites and CECABAR barytes now offer a complete range of fully proven and tested mud chemicals from leading European sources.

The service for full range supply shows marked economy in procurement and ensures properly phased deliveries.

MUD

CHEMICALS by CECA

Available in all major oil centres

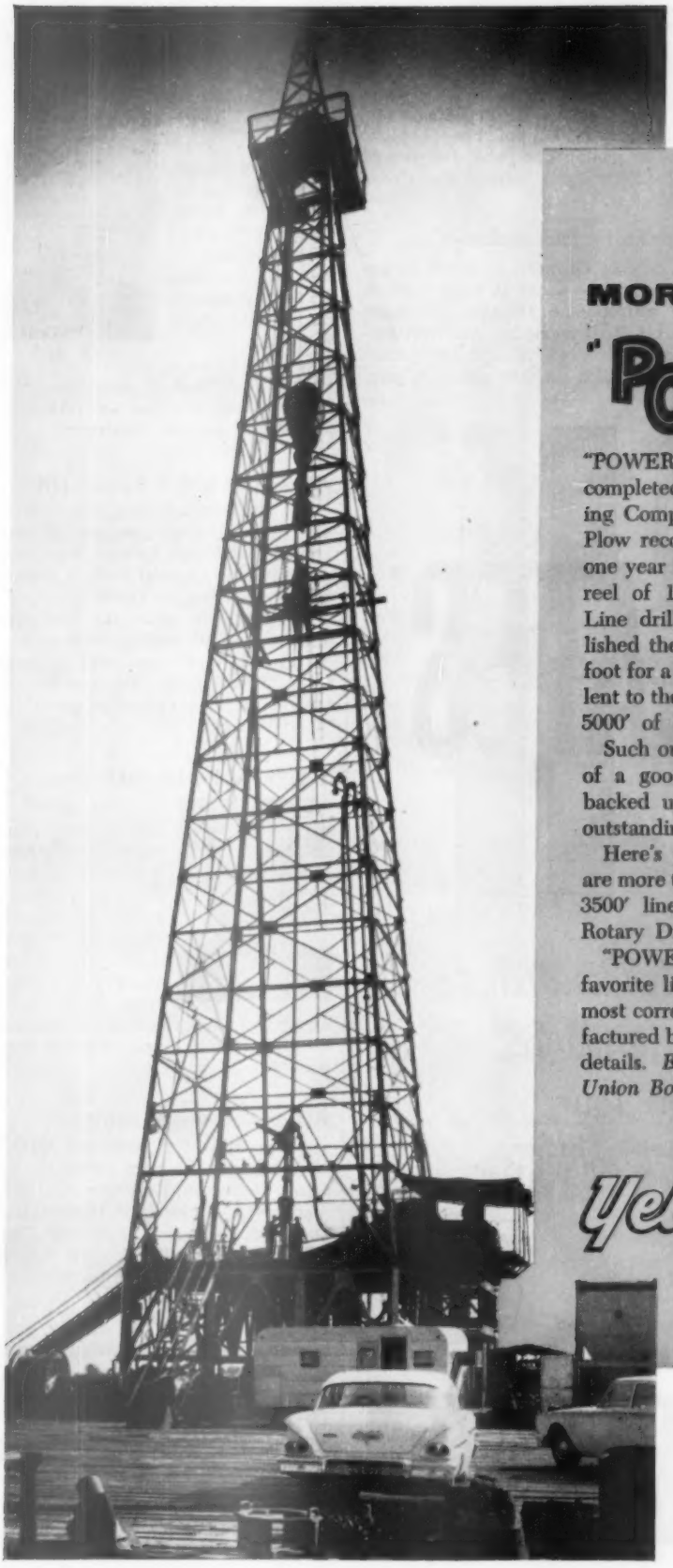
Sales offices in all major European Countries. Warehousing services available in certain major fields. Laboratory and Technical Facilities for specific problems.

CECA

THE BRITISH CECA CO. LTD.

175, PICCADILLY, LONDON, W.1.

Cables: ACTICARBON, LONDON



30%

MORE TON MILES WITH "POWERSTEEL"®

"POWERSTEEL" Rotary Drilling Line has just completed a ton-mile record for Grey Wolf Drilling Company, Rig #2 that surpasses Improved Plow records by as much as 30%! In service for one year from April, 1959 to April, 1960, a 3500′ reel of 1⅜″ "POWERSTEEL" Rotary Drilling Line drilled 3 wells totaling 40,622′. It established the enviable record of 18.5 ton miles per foot for a total of 64,644 ton miles. This is equivalent to the total ton miles normally expected from 5000′ of Improved Plow Rotary Drilling Line!

Such outstanding ton-mile service is the result of a good crew on the rig, good equipment, backed up by a tailored cut-off plan and the outstanding quality of "POWERSTEEL."

Here's proof that the men of Grey Wolf #2 are more than satisfied: They've replaced the first 3500′ line with a 5000′ 1⅜″ "POWERSTEEL" Rotary Drilling Line!

"POWERSTEEL" is rapidly becoming the favorite line in the oil fields — it's the strongest, most corrosion and abrasion resistant rope manufactured by B & B. See your supplier for complete details. *Broderick & Bascom Rope Co., 4203 Union Boulevard, St. Louis 15, Missouri.*

Yellow Strand.

"POWERSTEEL"®

WIRE ROPE

has been promoted to Brookhaven district manager. At La Habra, James F. Russell was promoted from sales engineer to district manager.

Other recent changes made by Welex include: D. J. McCabe, from logging operator to field engineer at La Habra; Wayne Plumlee, from Ventura shooter to La Habra sales engineer; B. M. Slater, from logging operator to field engineer at Pauls Valley; Billy Crice, from sales engineer to assistant district manager at Bakersfield; T. L. Hargis, from logging operator to field engineer at Alice; and G. L. Slack, from engineer trainee to field engineer at Houma.

J. D. Daigle joins Tex-Tube

. . . as a field engineer. Making his headquarters in Houston, he will work in that area and throughout the eastern Gulf Coast region in Texas, Louisiana, and Mississippi. For 11 years prior to joining Tex-Tube, Daigle was with Union Texas Natural Gas Corp.

Jack Roff rejoins McEvoy Co.

. . . as sales engineer, in which capacity he will be active in sales work in the metropolitan Houston petroleum market. Roff previously was with McEvoy from 1945 through 1959. During this time he was active in sales work in East Texas and Fort Worth, and was district manager for the Gulf Coast, Arkansas-Louisiana-Texas area.

W. B. Kerr becomes manager

. . . of the midwest division of Ralph N. Brodie Co., according to E. D. Brodie, general sales manager of the San Leandro, Calif. company. He succeeds A. J. Weckler.

W. B. Kerr

Kerr joined Brodie more than 5 years ago as a field engineer. He later was promoted to assistant division manager.

Agreement with F. Perkins Ltd.

. . . of Peterborough, England, to market Perkins diesel engines in the United States and Canada, has been completed by Chrysler Corp.'s Marine & Industrial Engine Division.

Chrysler will offer the complete line of Perkins high-speed diesels—3, 4, and 6-cylinder units ranging from 25 to 130 hp. The engines are liquid cooled and operate at speeds up to 4,000 r.p.m.

S. S. (Pete) Parker takes over

. . . as president and general manager of National Sales Co., San Francisco, a wholly owned subsidiary of National Tank Co., of Tulsa. He will continue to be a director and vice president of National Tank. Parker has been with the company for 23 years.

Al Romano is sales engineer

. . . responsible for sales and service of valves in Southern Louisiana for Grove Valve & Regulator Co. Romano, who will locate in Houma, La., previously was with Shaffer Tool Works in Houma. He is the former co-owner of LIR Construction Co., Inc., Lafayette, La.

Saunders is Canadian manager

. . . of Electro-Technical Labs, division of Mandrel Industries, Inc., announces Doyle D. Mize, Mandrel vice president. In his new position, Don A. Saunders will direct all sales and services for the geophysical instrumentation company in Canada from offices in Calgary.

For the past 3 years, Saunders was

H-O-H*

GLUCOSATES*

Improved Through Research
Proven By Performance
The Best For Your
Water Treating Problems

WE READ WATER* H-O-H ESTABLISHED 1931

Write for literature on your letterhead.

*REG. U.S. PAT. OFF.

D. W. HAERING & CO., INC.
ANALYSTS · CONSULTANTS · MANUFACTURERS
P. O. Box 10337
San Antonio 21, Texas

Memo from GULFCO!

Despite an industry drop in completed wells of 4% in 1959, Gulfco wellhead installations were up 33%!

Why?

1. **Gulfco installations cut completion costs.**
2. **More operators learned to depend on Gulfco service and quality.**
3. **Gulfco Xmas Trees are furnished to handle all pressure ranges, from lowest to highest, and all wells, from shallowest to deepest.**

. please check this!

GULF COAST MACHINE & SUPPLY CO.

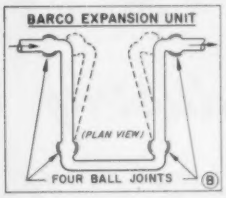
Beaumont, Texas

ASSOCIATION OF WELL HEAD EQUIPMENT MANUFACTURERS CERTIFIED

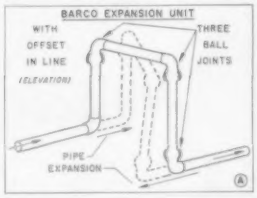
GULF COAST MACHINE & SUPPLY CO. GULFCO TRADE MARK PRODUCTS BEAUMONT, TEXAS

Handling Pipe Expansion in 1,300 ft. Asphalt Lines

PROBLEM—At this plant in Arkansas, asphalt at 500°F is pumped from refinery through approximately 1,300 feet of steam traced 6" insulated steel pipe. Heating of the piping causes a considerable increase in length. The problem of calculating movement and making proper allowance for this pipe expansion was complicated by the fact that the piping runs at various angles and elevations. *(See ANSWER below.)*



These schematic diagrams from Barco Bulletin 31A explain the accompanying photos.

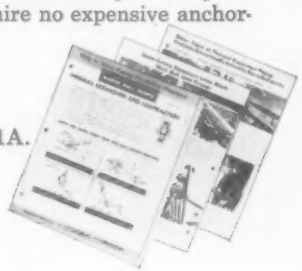


BALL JOINT EXPANSION UNITS

(NO REACTIVE FORCES)

ANSWER—Barco Ball Joints solved the "pipe expansion" problem SIMPLY, ECONOMICALLY, EFFECTIVELY. No complicated calculation of stresses was required—Barco Ball Joints (see arrows) provide *points of flexibility.* In offsets (A), three joints allow for expansion; or four joints (B) are used to form a minimum size expansion loop.

Rugged "Fire-Safe" Barco joints have no thin wall sections, no critical points of fatigue, no rubber seals. They develop no "end thrust"... *no reactive forces;* require no expensive anchoring. They are ideal for steam and all kinds of fluids, including asphalt. Choice of styles and sizes ½" to 16" to meet your requirements. SEND FOR BARCO BULLETIN 31A.



BARCO MANUFACTURING CO.

539H Hough Street, Barrington, Illinois
In Canada: The Holden Co., Ltd., Montreal

operations manager of Electro-Tech. He replaces T. G. Gilbert who is returning to Houston for special assignment.

B. Q. Welder is made manager

. . . of the newly created Oilfield Division of Hagan Chemicals & Controls, Inc. The division will offer such water-oriented products as controlled solubility phosphates, scale solvents, injection stimulants, and biocides.

Welder, who joined Hagan in 1945, has been in charge of oil-field and boiler-water chemical sales the past 2 years. He has also served as a staff and service engineer for Hall Laboratories, a Hagan division.

Hydril Co. adds David Carnahan

. . . to its California sales force. He has held various sales and management positions with western manufacturers. For 2 years Carnahan was vice president and chief of an international contracting firm.

Jaeger-Cordray, Inc. appointed

. . . representative for the southeastern region of Southwestern Industrial Electronics, Inc. The Orlando, Fla. organization is headed by Don Jaeger and Jack Cordray.

Construction company is formed

. . . in Houston by J. A. Newsome, Jr. and Paul F. Wolfinger to provide petroleum and natural-gas industries

J. A. Newsome, Jr.

P. F. Wolfinger

with experienced supervision in the construction of compressor and pump stations and other facilities.

Since 1948 President Newsome has been associated with research and development of oil and gas equipment, installation of production facilities, and industrial sales with Parks Engineering Co., Parkersburg Rig & Reel Co., and Tellepsen Petro-Chem Constructors.

Wolfinger, executive vice president, has been active in the construction of industrial plants since 1939 with Man-

WHEN CASING MUST BE CENTERED

THE LARKIN DOUBLE BOW DOES IT BEST

FIG. 905 LONG LOK-ON

Highest centering strength • Lowest permanent set • Five ranges for easy starting and maximum efficiency in any casing/hole size combination • Available . . . "Through Your Supply Store."

LARKIN PACKER COMPANY

DIVISION KOEHRING COMPANY

WAXAHACHIE, TEXAS

LARKIN LEADERSHIP HAS BEEN EARNED BY YEARS OF DEPENDABLE PERFORMANCE

LARKIN

...Through Your Supply Store

hattan Construction Co., Midwestern Constructors, Fulton Engineering, Carson-Wolf Corp., and Tellepsen Petro-Chem Constructors.

Oil Base, Inc. adds two

. . . in the persons of Daniel C. York, field engineer at Opelousas, La., and Halton (Jack) Trout, plant superintendent at Houston.

York was formerly with Baroid, Hycalog, and Hudson Construction in engineering capacities. Trout served with Gulf Oil, National Supply, and Homco at Odessa, Tex.

Lunkenheimer Co. transfers

. . . W. Britt Garrison from its Denver sales office to the Los Angeles branch office, announces Melvin W. Pauly, vice president in charge of sales, of the Cincinnati valve-manufacturing firm. Garrison will cover southern California with L. Allen Barth, also of the Los Angeles branch, assisting N. R. Crum, California manager.

Herbert Alexander is appointed

. . . technical consultant for Plastic Applicators, Inc., Odessa, according to Cordell Garner, vice president in charge of sales. For 15 years Alexander was associated with Chemical Process Co., of Breckenridge, Tex., in various positions. Most recently he served as executive assistant to the vice president, operations manager.

Allis-Chalmers Mfg. announces

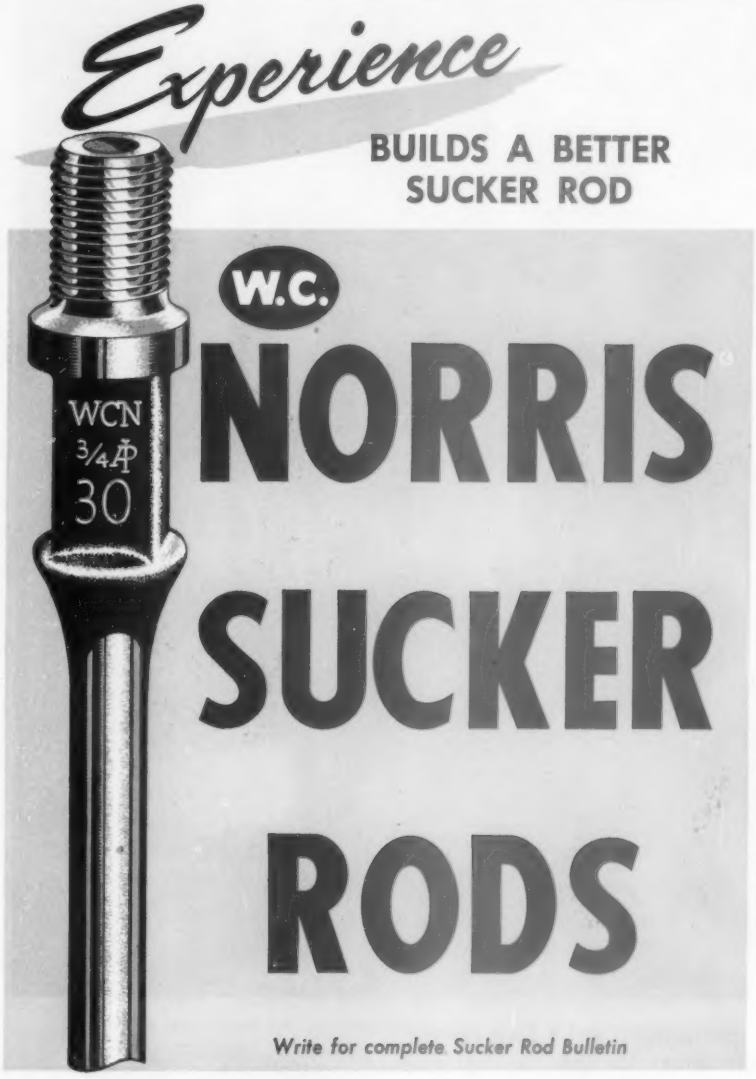
. . . the appointment of G. A. Saar as general manager, mechanical departments; and of W. M. Terry, Jr., as general manager, electrical departments.

Saar, who had been assistant general manager of the Industrial Equipment Division, is now responsible for operations of the processing machinery, compressor, and West Allis pump departments.

Terry, director of engineering coordination for A-C Industries Group since 1957, is now responsible for the operations of the Norwood (Ohio) Works, including the electrical and pump departments there. He will also oversee the control and industrial systems departments, along with the rectifier section at the West Allis Works.

Edmund B. Lennig to represent

. . . American Meter Co.'s San Francisco sales district, according to C. B. Dushane, Jr., vice president of sales. Lennig recently completed American Meter's 6-month gas-measurement school at the company's Erie, Pa., plant.



Licensing agreement is made

. . . by Automation Industries, Inc. and Halliburton Co., whereby Halliburton, through its Welex subsidiary, will enter the field of ultrasonic nondestructive testing, and will begin offering the service on a production basis immediately.

The agreement caused Automation to extend licenses on certain patents to Halliburton for use in the oil and gas industry on a world-wide basis. In addition, Automation received $102,000 in cash and will receive a royalty amounting to 5% maximum and 2½% minimum on Halliburton's ultrasonic inspection sales for the next 10 years.

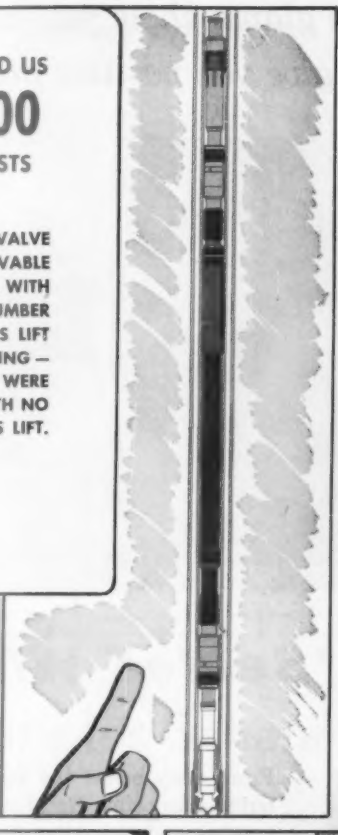
1.

THIS OTIS TOOL SAVED US

$350,000.00

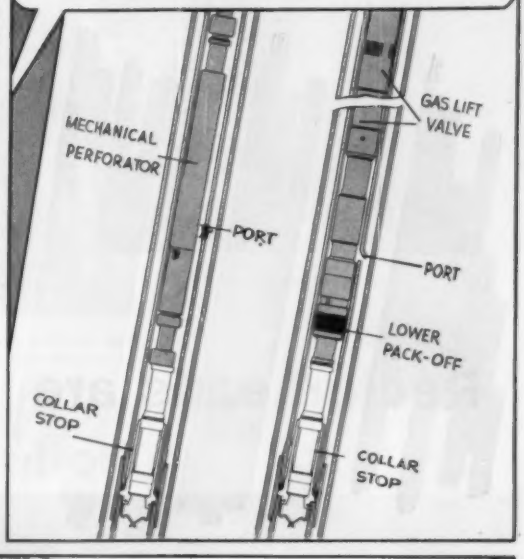
IN WORKOVER COSTS LAST YEAR.

IT'S THEIR TYPE C GAS LIFT VALVE RUN WITH A TYPE G REMOVABLE TUBING PACK-OFF ANCHOR. WITH IT OTIS CONVERTED A NUMBER OF OUR OLD WELLS TO GAS LIFT WITHOUT PULLING THE TUBING — AND THEY WERE WELLS THAT WERE ORIGINALLY COMPLETED WITH NO PROVISIONS MADE FOR GAS LIFT.



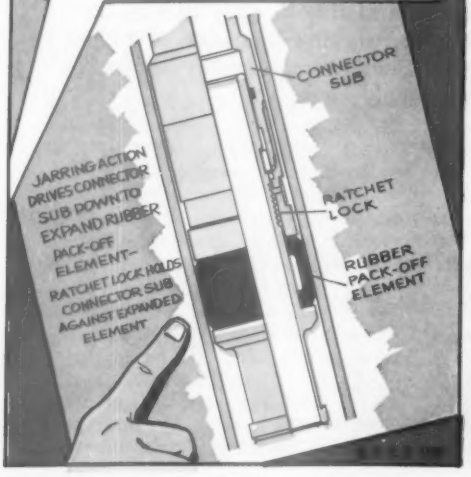
2.

The technique Otis uses in this type of recompletion is simple and fast. First, their gas lift specialists determine the number of valves required and the proper spacing. Then they cut a port in the tubing with a wire line mechanical perforator and pack-off their gas lift valve opposite the perforation. A full opening tubing stop locks the tool in the tubing. To give you some idea of the capacity of this type of installation, WE'RE MAKING 1,200 BARRELS OF FLUID PER DAY THROUGH 2" TUBING FROM ONE OF THESE WELLS.

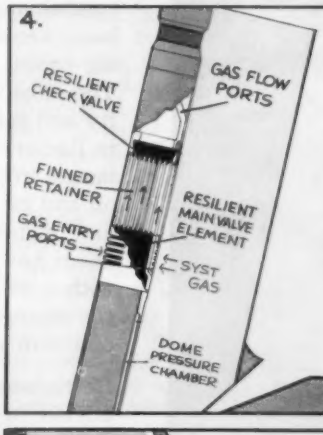


3.

And this Otis pack-off gas lift completion technique is one of the most foolproof we've ever had. For example, we know each valve straddles the port in the tubing because the lower pack-off anchor is landed on the same Otis collar stop used to locate the perforator. Also each check valve and pack-off can be tested as it's run by pressuring up on the tubing. And because the pack-off elements are set against the tubing wall mechanically, we know they'll stay expanded. Here's how the pack-off elements work.


CONNECTOR SUB
JARRING ACTION DRIVES CONNECTOR SUB DOWN TO EXPAND RUBBER PACK-OFF ELEMENT—
RATCHET LOCK HOLDS CONNECTOR SUB AGAINST EXPANDED ELEMENT
RATCHET LOCK
RUBBER PACK-OFF ELEMENT

4.



As for Otis Gas Lift Valves — this diagram will help explain why THEY REALLY LIFT THE FLUID. They have no spread — consequently you get maximum efficiency from your system gas. The valves have no moving metal parts, no bellows to fatigue, no seats to cut out — and they have extra flow ports to pass a maximum amount of gas at a minimum pressure. With Otis valves in your well you can produce by either continuous or intermittent lift — without the expense of changing valves.

Otis tells us they run a lot of these pack-off gas lift valves to straddle old style "piggy back" valves and eccentric side pocket mandrels when they become defective. They also install them in dual- and triple-completions. BEFORE YOU PULL TUBING to put any of your wells on artificial lift, I suggest you GET IN TOUCH WITH OTIS and talk to their gas lift specialists. We did, and it gave us some of the most economical and efficient gas lift installations we've ever had. It's no wonder Otis has the reputation of being

"First in Gas Lift Control"

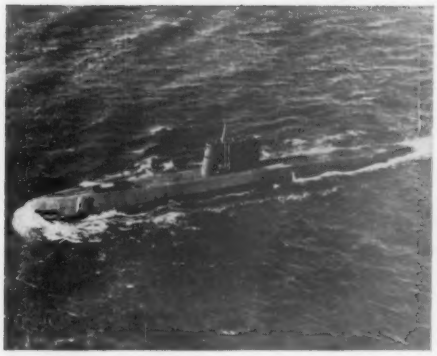
PRESSURE CONTROL OTIS SERVICE + EQUIPMENT

OTIS ENGINEERING CORPORATION

General Offices: 6812 Denton Drive · Dallas

Branches Throughout the Oil Country

These Space age giants show you why
Rector casing heads give you positive protection



Rectorheads are *"Sealed With Steel"*

From deep below the polar ice cap to far into outer space the Nautilus submarine, the B-58 bomber and the Atlas Missile all face withering heat, arctic cold, crushing pressure and grinding torque.

The same welding principle that insures durability and safety in these jet age giants is utilized in Rector's "Sealed With Steel" casing heads to insure trouble-free completions for all types of oil and gas wells. Built to withstand heat, shock and highest wellhead pressure, Rector casing heads have a precision ground joint seat, fitted with a welding ring which is welded directly to the casing. An API ring gasket completes the exclusive ring of steel pioneered by Rector.

Rectorheads are available in sizes through 20" offered in service working pressures to 15,000 P.S.I. See your Rector representative or consult your favorite supply store.

30 YEARS MAKING THE OIL INDUSTRY SAFER

Rector

Well Equipment Co., Inc.

Making the Oil Industry Safer!

1100 North Commerce, Fort Worth, Texas Houston Plant: 2215 Commerce Street

EXPORT REPRESENTATIVES: Continental-Emsco Co., Mid-Continent Supply Co., Oilwell Division of United States Steel Corporation

MONOGRAMMED EQUIPMENT CERTIFICATE NO. 2158

DOCKS OF TRIPOLI bustle with activity as Loffland Brothers, Tulsa, unload two more drilling rigs that will work in Libya. With another two units due soon . . .

Contractor triples Sahara effort

IN A LAND only slightly changed by the last 2,000 years, Loffland Brothers, Tulsa, is increasing its operations from two to six rigs as North Africa's oil development increases in scope.

Fabrication is now being rushed on two new rigs which will be trailer-mounted and especially equipped for desert operation. They will drill for Esso Standard (Libya), Inc., bringing to four the number of Loffland rigs running for that operator.

Loffland just recently completed the rigging up of two other rigs in Libya, one for Mobil Oil Co. of Canada, Ltd., and the other for Oasis Oil Co. of Libya. They were shipped from Maracaibo, Venezuela, to Tripoli, Libya's main port.

The two new rigs, being built by Unit Rig & Equipment Co. in Tulsa, will be identical to Rig V-55 now drilling for Esso southwest of Bengazi. All major equipment is mounted on trailers equipped with 63-in.-high by 23-in.-wide flotation tires for use in deep sand. Separate trailers will carry the Mid-Continent U-36-A draw works, portable mast, mud pumps, substructures, and utility unit.

Loffland Rig V-2 is drilling for Mobil about 380 km. southwest of Bengazi in Concession 12. Rig. V-26 is drilling for Oasis in Concession 25, about 160 km. south of Sirte or about 600 km. southeast of Tripoli.

A veteran of African drilling, the contractor placed its first rig in operation in Libya in January 1958, with Rig V-34 drilling for Esso. This rig drilled the Zelten field discovery for Esso to bring in one of the biggest discoveries in recent years. Loffland Rig V-55 went into operation for Esso in 1959 in the Zelten area, Concession 6.

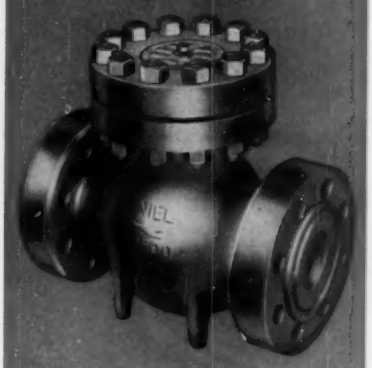
Rig V-34 has a Mid-Continent U-1220 draw works and is located about 200 km. southwest of Bengazi while Rig V-55 has a Mid-Continent U-36-A draw works and is located 400 km. southwest of Bengazi.

Main problems for African rigs are transportation and communications. Libya, which has been inhabited since before Christianity, is about 2½ times the size of Texas. It had a population of only slightly over 1 million in 1954, including a large number of nomads.

Roads into the interior are generally extremely poor with troublesome deep sand and rough, rocky stretches. A record high temperature of 136.4° F. in the shade was recorded south of Tripoli. In spite of these handicaps, modern transportation equipment, including oversize White Autocar Cummins-powered diesel trucks, keeps the drilling operations running smoothly. Crews live in self-sufficient camps adjacent to each rig.

Loffland Brothers maintains operational headquarters in Bengazi with

check the valve



that doesn't chatter

Check the Daniel Piston Controlled Check Valve for quiet efficiency in preventing flow reversal. Choose from stock in sizes and types covering a wide range of both compressible and non-compressible fluid services. Patented, free-floating piston design eliminates chattering and minimizes pulsation. Available in carbon or cast alloy steels with stainless trim, or with hard-faced internals for mud-line service. Up to 10,000 lbs. A.S.A. ratings.

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INCORPORATED

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HOmestead 5-3451

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Write for Daniel Catalog Section "H"

WINNING COMBINATIONS

by

McKISSICK

WIDEST POSSIBLE RANGE OF SIZES AND CAPACITIES — UNBEATABLE MCKISSICK CONSTRUCTION —

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Wayne Burris as general drilling superintendent. The company also has an equipment yard there. W. A. Lambert, contract representative, has offices in Tripoli.

California wildcat holds hope

WHAT MAY BE another gas field or northern California's first oil field may be in the offing for Occidental Petroleum Corp.

The effort is a wildcat in SE 23-26n-5w, Tehama County. The site holds hope because of its proximity to an abandoned test 1 mile northeast which had both oil and gas shows.

Gene Reid Drilling, Inc., of Bakersfield, is the contractor. Drillsite is 9 miles southwest of the town of Red Bluff.

Active Rigs

	Rotary	Cable	Total†
Alabama	6	0	6
Alaska	5	0	5
Arizona	1	0	1
Arkansas, South	29	0	29
California, Offshore	5	0	5
Inland	108	1	109
Colo., excl. Four Corners	17	5	22
Four Corners	10	2	12
Florida	2	0	2
Georgia	2	0	2
Idaho	0	0	0
Illinois	51	23	74
Indiana	16	22	38
Iowa	0	0	0
Kansas	94	1	95
Kentucky, Western	6	50	56
Louisiana, North	101	0	101
South Inland	222	0	222
Offshore	56	0	56
Michigan	48	36	84
Mississippi	70	0	70
Missouri	1	1	2
Montana	24	1	25
Nebraska, East	2	0	2
West	24	0	24
Nevada	1	2	3
New Mexico, East	82	22	104
West	35	5	40
North Dakota	18	0	18
Okla., excl. Panhandle	250	77	327
Panhandle	26	6	32
Oregon	0	1	1
South Dakota	1	2	3
Texas, Offshore	1	0	1
East	55	0	55
Upper Gulf Coast	105	0	105
North	100	0	100
Panhandle	57	11	68
S. W., Corpus Christi	141	0	141
S. W., San Antonio	34	4	38
West	213	23	236
West Central	70	17	87
Utah, North	11	0	11
South	17	0	17
Washington	1	0	1
Wyoming	64	4	68
Reported U. S. total	2,182	316	2,498

*Report to AAODC by the International Oil Scouts Association.
†As of July 8, 1960.

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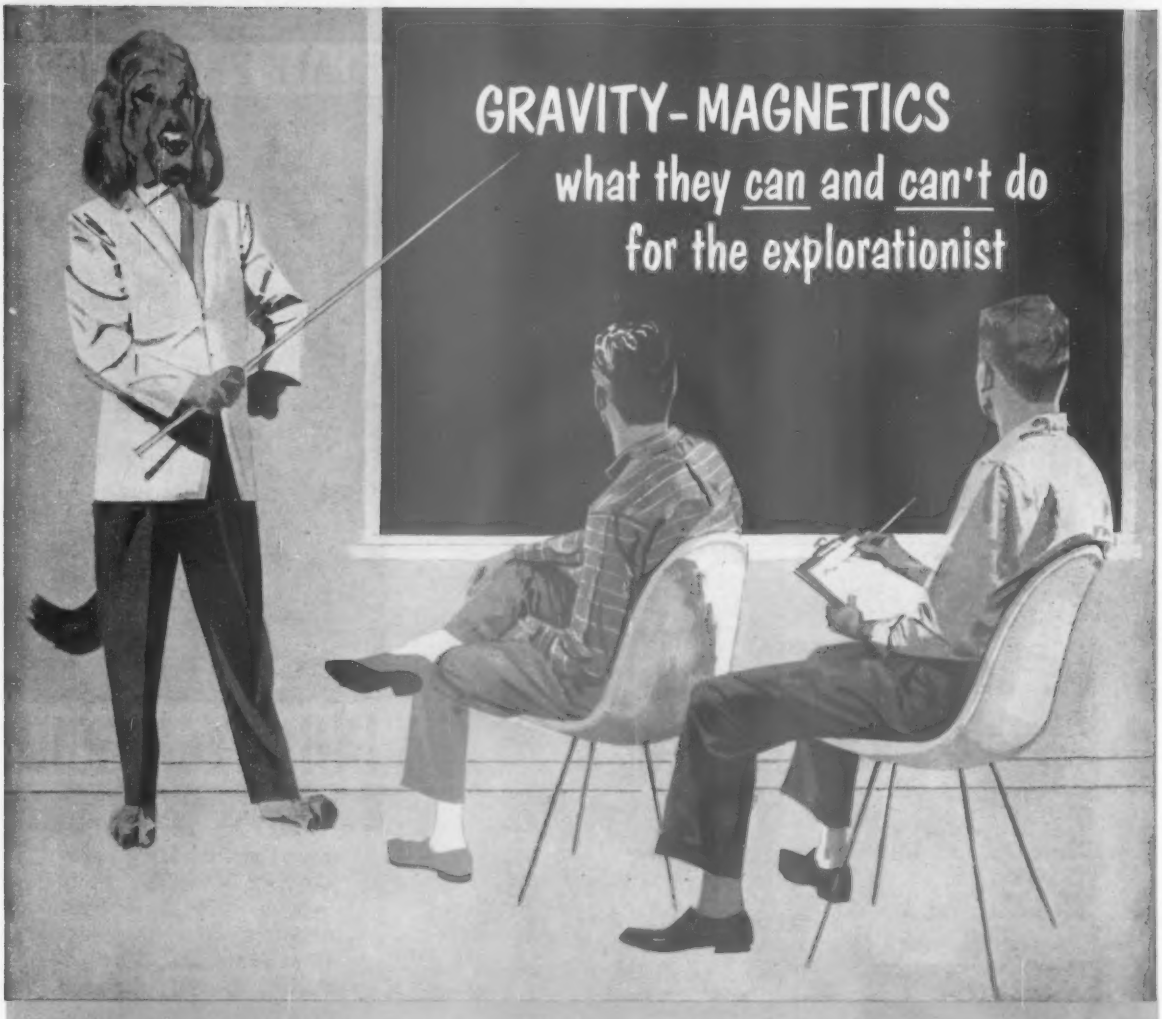

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"Dog-eared" is a term sometimes applied to gravity and magnetics as exploration tools, but these "old guard" methods of exploration can teach many of us new tricks about getting certain prospects surveyed quickly, efficiently and economically.

A number of tails began wagging after explorationists stood up on their hind legs and took a new sniff at prospects via the gravity-magnetics route. If you are interested in cutting costs, while answering specific geologic questions, give us a whistle and we'll trot out our new Bulletin GM59-1, **"Gravity-Magnetics . . . what they *can* and *can't* do for the explorationist."**

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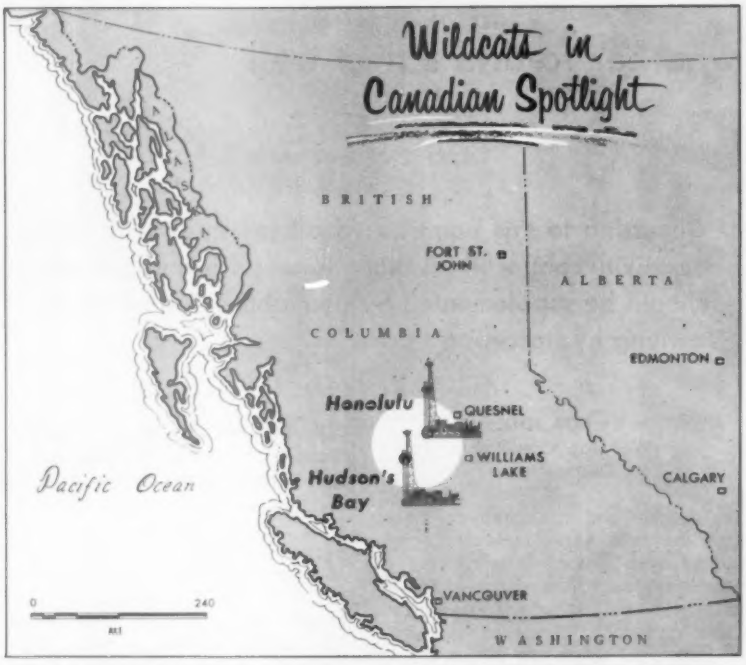

TWO RANK WILDCATS are in the news in western Canada today. In the Fraser River country of South Central British Columbia, Hudson's Bay Oil & Gas Co., Ltd., and Honolulu Oil Corp. will seek oil and gas production in a hitherto untested province.

Canadians watch two British Columbia wildcats

BY FRANK J. GARDNER

TWO of the most remote wildcats on the North American Continent are now in their initial stages. Drilling in an area of little-known geology and with meager knowledge of what the bit might penetrate, these two will be closely watched by Canadian oil finders.

In the Fraser River country of South Central British Columbia, Hudson's Bay Oil & Gas Co., Ltd., is drilling away at its 1-C-75-A Redstone wildcat, while Honolulu Oil Corp. has announced location for 1 Nazko, an 8,500-ft. wildcat 43 miles north of the Redstone operation. At last report, the Hudson's Bay test (contracted to 4,000 ft.) was drilling below 1,000 ft., while Honolulu was rigging up. Regent Drilling Co., Ltd., is contractor for Hudson's Bay, and Arrow Drilling Co., Ltd., for Honolulu.

Far from everywhere . . . This is the first oil push into this part of British Columbia. The wellsites lie about 200 miles north of Vancouver, 120 miles east of Bella Coola fiord, 300 miles southwest of the Peace River oil and gas country, 45 miles west of Quesnel, and 60 miles west of Williams Lake. More specifically, the Hudson's Bay well lies on Unit 75-A-93-B4, and the Honolulu well on Unit 4-L-93-B11. The nearest drilling has been done in the Chilliwack area 210 miles to the southeast, and at Prairie Creek, 215 miles to the northeast.

As might be expected, this new play has set off a leasing binge that now involves over 4 million acres. "Give me land, lots of land" is the hue and cry all up and down the Fraser River valley today. Honolulu, first in the region in early 1959, holds about 1½ million acres; Hudson's Bay entered the play in mid-1959 and now holds 2 million acres. Interestingly enough, both companies took out huge new permits after the wells were staked. Other permit holders include Charter Oil Co. (a land pioneer in southern B. C.), and Canpet Exploration, ltd.; these two moved in after the announcement of the Honolulu wildcat and sewed up about 200,000 acres each. Smaller amounts of acreage are held by Britalta Petroleums, Ltd.; Freehold Gas & Oil, Ltd.; Pacific Northern Oil, Ltd., and others.

Doubtless, by the time you read this, other Canadian companies will have moved into the play. Maps of the permits taken so far reveal an interesting northwest-southeast alignment that would indicate the trend of things to come.

In a region of unknowns . . . Geologically, nobody knows what to expect here in the subsurface. Obviously, a good deal of seismic reconnaissance has been done, and the two wildcats now on the way down have, no doubt, some sound seismic reasoning behind them.

The region lies in the plateau country between the Coast Range and the Cariboo-Monashee mountain ranges. Geologically, it is highly complex, with numerous fault blocks of large displacement, and great amounts of volcanic and highly metamorphosed rocks exposed at the surface. A great thickness of sedimentary rocks is believed to underlie the region, however, and until condemned by the drill, the interior plateau country of B. C. must be classified as a potential oil and gas province.

Perhaps the best bet for reservoir rocks lies in Late Cretaceous and Tertiary beds. Source beds of Permian and Triassic age are believed to underlie these. Surface work in the region has disclosed some traces of hydrocarbons in outcrops.

Besides complex structure and doubtful stratigraphy, operators here are faced with widespread glacial deposits, which hamper both surface work and seismic exploration. To add to these difficulties, the topography is rugged and forbidding in many places.

The odds are long . . . It's quite a gamble, then, on the part of these two companies now searching for oil in South Central B. C. If they should hit, however, there would be some advantage in being where they are. The Trans Mountain Pipeline lies only 130 miles southeast, and the Vancouver market only 200 miles away. The odds are long, and the stakes are high.

Proper evaluation of electric logs is a big step towards determining whether to drill a new well

PART 2 OF TWO PARTS

Discussion to this point has dealt primarily with water resistivity control which alone is not sufficient, but which should be supplemented by available information concerning hydrocarbon shows.

BY BOB JONES
Well Log Consultant,
Casper, Wyo.

A PROGRAM of exploration to find entrapments through the use of water resistivities, or salinity theories, can be successful trap-wise, but can fail to find hydrocarbon production simply because of poor source of or migrational timing of hydrocarbons. These remarks concern not only search for stratigraphic traps, but general exploration. This risk is present in current techniques to quite a large degree, contributing to lower success ratios. Any prospect supported by sample or DST oil shows in a horizon is therefore enhanced, but it is a common practice to overlook dry-hole-log calculations and the resulting shows that can be determined to exist.

Sufficient progress has been made in the use of log interpretations to permit dependence upon such calculated shows. Furthermore, physical evidence of shows is not often definitive in strength, whereas log work can delineate fair, good, and excellent shows in many cases. In addition, existing shows may have been washed out of samples or blocked from entering drill-stem test because of formation permeability damage, thereby remaining undetected except by log analysis.

The computation of hydrocarbon shows per horizon from electric logs at each control point in the exploration pattern, then, is used to complement trapping indications gained from water-resistivity studies. When both indicators direct attention to a prospective horizon trap, a wildcat venture in such proposed drilling area is indicated to have very good prospects of finding production. Efficiency of calculating and comparatively rating the dry hole shows from logs, combined with proper interpretation of water results, will be determining factors in the success ratio of this exploration approach.

A typical tabulation of log-evaluation results in one Dakota sand well is shown in Fig. 1. Show ratings are not derived from hydrocarbon percentages but are arrived at independently. It is possible to first derive the show rating and from this rating, arrive at hydrocarbon per cent. The process is in use, but is considered to be in an experimental stage. As a rule, only "excellent" show ratings indicate a formation to be productive of hydrocarbons, "good" ratings being oil or water productive, while "fair" and "poor" ratings almost always occur in water-productive intervals.

It is generally understood that log calculations actually compute the percentage of water existing in porosity voids of clean or relatively clean formations, and that hydrocarbons occupy that per cent of pore space not occupied by water. Hydrocarbon per cent is then 100% of pore space less per cent water saturation. Oil saturations are often obtained in this manner and mapped or reported in place of water saturations. A formation interval is usually considered to be capable of producing hydrocarbons if it contains 50% or more hydrocarbons.

INTERVAL	FT. SD. / FT. POR	R_w - 100°	% POR. / % HYD.	SHOW RATING
4600 - 25	15 / 10	1.2	17 / 0	NONE
- 38	13 / 0	-	- -	-
- 53	10 / 10	0.83	15 / 28	POOR
- 78	22 / 22	0.32	16 / 52	GOOD

TABULATION of electric-log evaluations show these ratings of the Dakota sand in a well. This process, though in use, is considered experimental pending acquisition of more case histories. Fig. 1.

Fig. 2 again shows Miller Creek field, but for the purpose of presenting log-calculated hydrocarbon shows. Porosity values were obtained strictly from well logs, and of course influence the reported saturations as well as ratings of shows. Per cent porosity used in computations and calculated per cent hydrocarbons are shown. The Dakota formation in this area varies from 12 to 22% porosity and, in the case of electric log only, failure to arrive at correct porosity reflects as an error in calculated hydrocarbons. Those experienced in log interpretations will recall, though, that upper and lower limits of porosity assumption result in maximum and minimum hydrocarbon shows calculated, and that such range of data can be on the positively encouraging or discouraging side of the problem. Results of this work must take this experience into account and honestly question those cases in which results can be ambiguous. Over-all results in practice give good average indicators, and there is the accompanying water - indicator work to aid in resolving specific problems. Physical shows of record are also helpful in over-all inspection and interpretation of pattern data.

Returning to the Fig. 2 discussion, fair shows were determined in the key well in Section 7, which when considered with the encouraging water information discussed previously, complete the evaluation to show this the most interesting dry hole present be-

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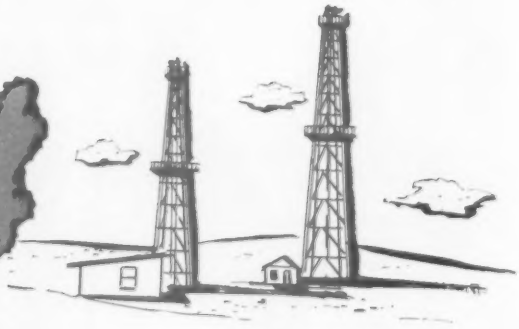

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fore field discovery. Note that calculations indicate no shows present in Section 11, and poor shows were calculated in the east half of Section 16. Summary notes of physical oil shows are given as partial support for log-evaluation results.

It is interesting to note that log calculations in the first confirmation test (Skelly well in NE SW Section 8), show transgression to water production with depth in the Dakota sand. Principal water-oil production contact appears to be at log depth 6,040 ft. with oil saturations of 58% above and only 30% below this contact.

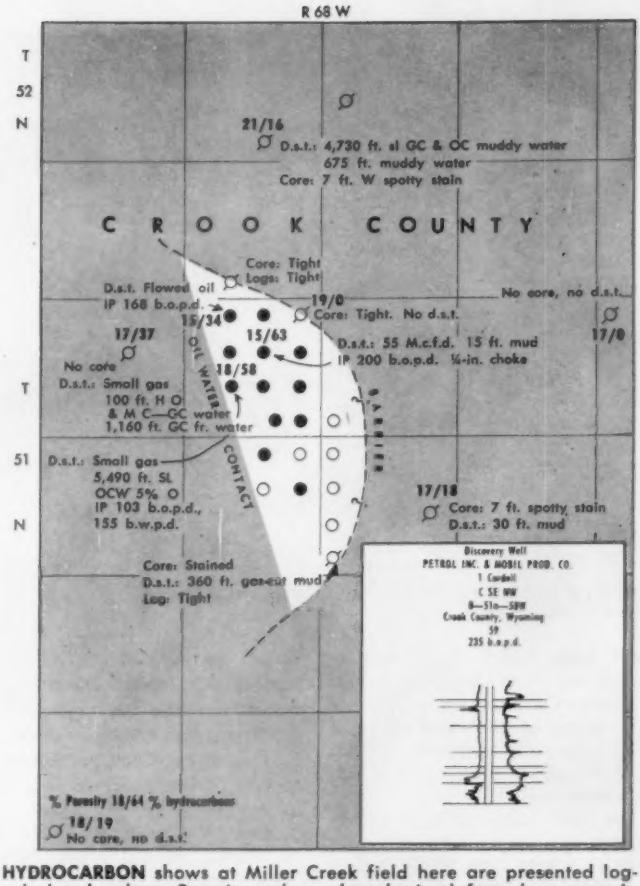
Fig. 3 gives a similar summary of physical and log-calculated hydrocarbon shows in Coyote Creek field. In this case, calculated shows are similar in dry holes north of the field and in the key well west of production in Section 33. Core analyses results are reported for the Section 33 well. Definitely poor shows are calculated approximately 300 ft. structurally lower in Section 8.

It is not particularly surprising to find calculated oil shows existing in regions of the water-salinity pattern which are indicated by water-resistivity values to be flushed. Several theories explain such shows, one being an idea of hydrocarbon leakage through field barriers in stratigraphic traps. Log results seem to support his theory, which can also be interpreted as follows. In trap environments such as these, a number of separate traps can exist within relatively short distances, many of these traps being very inefficient in retention of hydrocarbons. These imperfect traps should exhibit flushed water values. The Kewanee well in Section 8, Fig. 3, may be a good example of such intermediate condition.

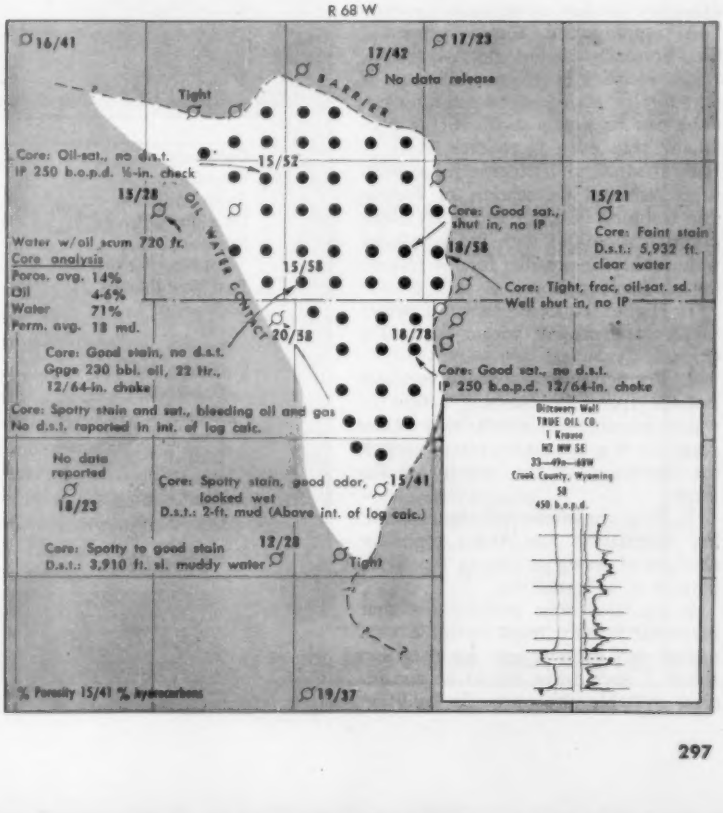
Fig. 4 reviews the results of resistivity and hydrocarbon indicators in Coyote Creek field and surrounding dry holes.

Conclusions

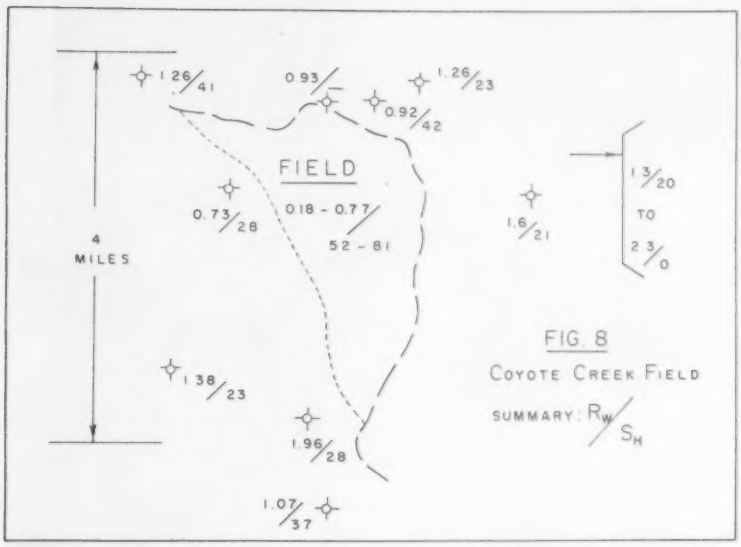
At least five distinct exploration techniques are now being applied to interesting exploration areas, kind and amount of work done in each situation determined to a large extent by the type of formation trapping expected in prospective horizons. When two or more of these approaches confirm a prospect area, the area is desirable for exploration, if economics are within requirements. The exploration approach suggested herein promises to become accepted as a new and separate approach in study of



HYDROCARBON shows at Miller Creek field here are presented log-calculated values. Porosity values also obtained from logs vary in the area from 12 to 22%. Summary notes of physical oil shows lend partial support to calculations. Fig. 2.



SUMMARIES at Coyote Creek field show physical and log-calculated hydrocarbon shows. Fig. 3.



A REVIEW of the results of resistivities and hydrocarbon indicators in Coyote Creek wells and adjacent dry holes. Fig. 4.

prospect areas which have well-log control. Even partial well-log control may definitely support or deny other control results, as explained above in remarks concerning one-well control, which may seem extreme, but which is not uncommon.

It has been demonstrated by reported examples that formation water resistivities within known oil-producing traps can be differentiated from those values calculated from logs of water productive well locations outside the oil productive trap. These examples concern stratigraphic formation trapping and, though scope of this presentation has not permitted, water resistivities from well logs of structurally and fault-trapped formations can be shown to identify a producing trap even more clearly.

By theoretical discussion it has been suggested that delineation of formation trapping in clean and fairly clean porous formations with log-calculated water values is possible for the following reasons:

1. Higher concentrations of water salinity are present within formation traps.

2. Formation traps are effectively isolated from the flushing action of water movements, which have taken place, or that are taking place through the formation in the vicinity of the traps.

3. That consistent techniques of SP log calculation can truly represent changes of water salinity in the water pattern of a formation.

It has also been pointed out that indicated salinity traps must be supported by encouraging hydrocarbon shows if such traps are to be considered drillable prospects. In addition to any physical formation shows of record, each available well log should be analyzed and rated in terms of hydrocarbon percentages or show ratings. Ratings of excellent, good, fair, poor, or none, when observed in a number of dry holes can be used to complement water-salinity indications in delineating areas of prospective hydrocarbon entrapment.

Recently, the first oil discovery resulting largely from using this technique was completed. Stuarco Oil 2 Caster C SW NE 1-44n-67w, Weston County, Wyoming, at the Lonetree Creek field, opened a new pay in the Dakota which flowed 455 bbl. of oil per day through a 13/64-in. choke.

Much work has been done in evaluating prospects using these well-log techniques. Many programs of this sort are held confidential and salinity indications of trapping are being researched by various methods.

Since electric logging has been the most consistently used test tool in all wells, it is most logical that only through the proper use of these logs can a consistent and useful volume of control data be obtained. Use of electric log only, as is necessary in many cases, is recommended, and the techniques described herein are presented as a new and very promising exploration method in Rocky Mountain formations.

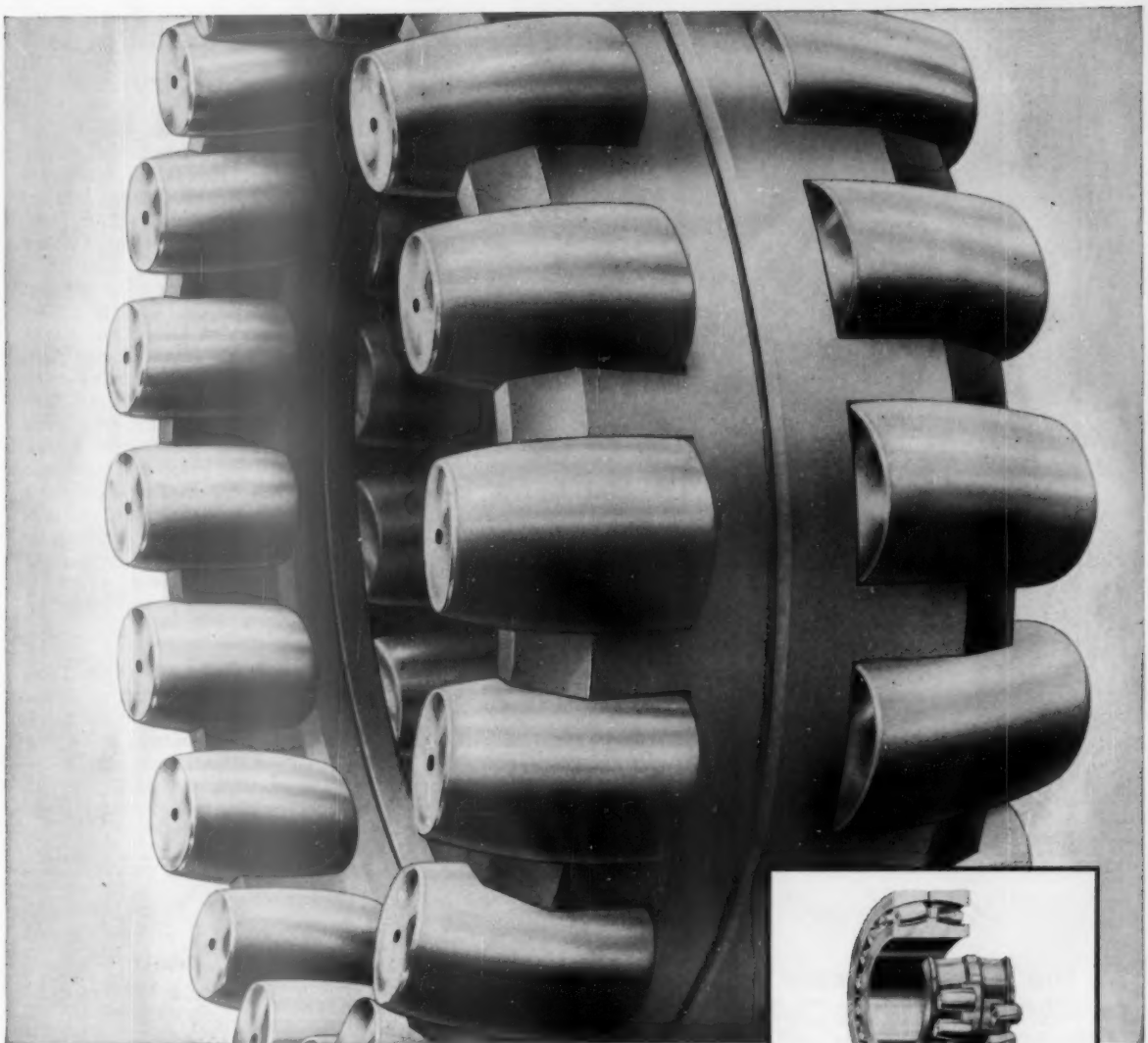
Pennsylvanian pays at North Texas Grayson wildcat

Pennsylvanian production was opened at Larson and Thomas 1 Beth Brown, Kimbell, Bell Unit, a Grayson County wildcat 1½ miles east of Sherman in North Texas.

The well flowed 1,040 M.c.f.d. from perforations at 7,111-7,225 ft. Gas-oil ratio is 118,000:1. Location is in the south tip of H. C. Atchison Survey, A-22, in the east central part of this North Texas county.

June Multiple Completions

	Dual	Triple	Quadruple
California	1	...	...
Kansas	6	...	...
South Louisiana	23	4	...
Louisiana Offshore	7	5	1
Mississippi	5	...	...
West New Mexico	1	...	...
East New Mexico	1	...	...
Oklahoma	38	...	...
Texas	55	1	...
District 1	2	...	...
District 2	9	...	...
District 3	15	...	...
District 4	7	1	...
East	9	...	...
District 7-D	2	...	...
West	8	...	...
District 9	1	...	...
District 10	2	...	...
Total June	**137**	**10**	**1**



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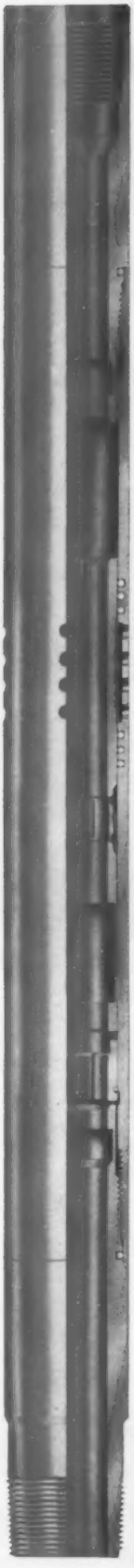
Alaska's Yakutat area to get fourth try

IN ALASKA, Colorado Oil & Gas Corp. spudded its fourth well in the Yakutat area. This is the 1 Dangerous River Unit well, located 990 ft. from the north line and 1,650 ft. from the east line in 17-29s-37e, Copper River Meridian.

Colorado is operator for itself and Continental Oil Co. and Frankfort Oil Co. Frankfort joined with Colorado 4 years ago. In addition to drilling two wildcats, the firm participated in extensive surface geological surveys, gravity meter, and seismic work on the 1,100,000-acre unit. Continental joined the group in 1958 under special arrangements for a one-third interest in exploratory work extending through this year. Continental participated in the third wildcat, 3 Yakutat, which is about 15 miles northwest of the Dangerous River No. 1 project.

Well had shows. According to Colorado, the third well had good gas shows as did the two previous tries. Difficulty was encountered in keeping the third well under control. It attempted to blow out at 10,848 ft., total depth. No tests could be made

THE FOURTH WELL has been spudded in the Yakutat area of Alaska by Colorado Oil & Gas Corp. This new try is the 1 Dangerous River Unit. (Map from Alaska Oil Report, College, Alaska.)



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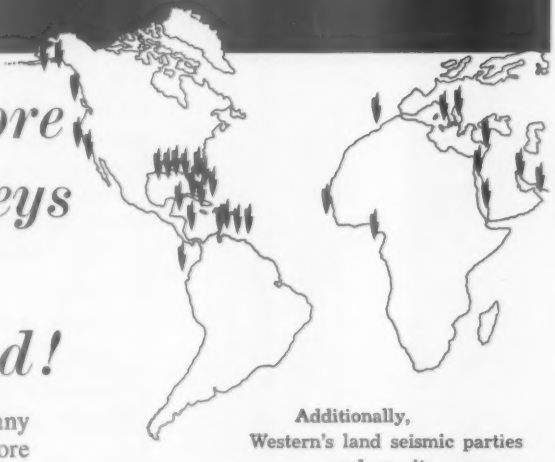

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due to these troubles. After unsuccessful sidetracking and redrilling a total depth, the well was abandoned.

The new well is being drilled on a large seismic anomaly. It will be taken to 11,000 ft. Terrain around the fourth well is flat and swampy, a problem that made it difficult for spotting location. The other three wells were drilled near Yakutat on flat terrain well overlain with gravel, moss, and soil.

Brooks Range. Colorado is interested in acreage north of the Brooks Range in addition to the Yakutat basin.

It acquired 11,395 acres in the region east of Petroleum Reserve 4 and bought two small unitized Cardwell rigs from the Navy. These have been moved to sites on the Gubik structure where gas occurs at shallow depths of 1,600 to 3,500 ft. Another 73,470 acres was acquired by the company near Gubik gas field and Umiat oil field. Exploration is under way in the area now by several companies.

Ontario's Princeton area gets 50-bbl. well

THE FIRST WELL by Mercury-Chipman Co., Ltd., of Toronto, in the old Princeton area of Oxford County, in Ontario, Canada, has been completed making 50 bbl. of 39°-gravity oil and 300 M.c.f. of gas daily. It opens a new pay zone in the basal Trenton formation at 2,890 ft.

Joint owner and drilling contractor is W. R. McMasters & Sons, Ltd.

The Princeton area is in Blenheim Township, in the Benwell Swamp region. It was found and has produced from another zone for many years, but has been relatively inactive until the new discovery.

The well, 1 Robert King, is on a 4,000-acre block, on which the operators have planned three more tests.

Because of proxminity to the metropolitan area of Toronto and Hamilton with its refineries and ready markets, crude in the area brings $3.15 per barrel. Gas sells for 40 cents per 1,000 M.c.f.

New triple-zone gasser in Alberta

A triple-zone gas well is reported by Omega Natural Gas Co., Ltd., at its 7-6 Enchant well on LSD 7, 6-14-17w4, Alberta.

The well flowed 2 M.M.c.f.d. from the First Bow Island on ½-in. choke from 2,524-54 ft. From the Second Bow Island sand it made 5,300 M.c.f.d. from 2,640-70 ft. on ½-in. choke. From the Blairmore at 2,910-80 ft. through ½-in. choke it made 1,200 M.c.f.d. The aggregate flow was 8,500 M.c.f.d. Reserves under the single section are calculated at 12.5 billion cubic feet.

This appears to be one of the most prolific gassers in the field which is 38 miles northeast of Lethbridge and 5 miles southeast of Enchant town. It lies 2¾ miles northwest of nearest production in Enchant field. It may be on a separate structure from the field itself.

British Columbia test gets good gas show

A VERY encouraging gas show is reported at a wildcat in northeastern British Columbia. The indicated discovery is Pan American Petroleum Corp. A-1 Deer Lake a-90-1, 45 miles northwest of Fort Nelson in the Bekami Lake region. Flow rate on first production test was 22,000 M.c.f.d., tempered with brackish water spray.

More tests are slated for this promising find on quarter unit A, Unit 90,

Rugged and trouble-free 30-hp **WISCONSIN ENGINE** powers portable shot hole rig

The Wisconsin-powered rig makes exploration drilling a low-cost one-man operation. It's light, easily portable, and dependable. One man can haul it and use it anywhere and in any season.

The 30-hp Wisconsin is precision-fitted for smooth-firing power and to cut wear and upkeep. Its high torque design delivers more bite at the bit — speeds drilling through tough formations without stalling the engine or work progress.

The air-cooled Wisconsin is smaller and up to ⅓ lighter than its water-cooled equal. There's nothing to dry up or freeze up — no water or anti-freeze to haul. And you don't have to buy, service, and replace radiators, water pumps, fan belts, and other water-cooling parts.

If you want dependable all-weather power for your oilfield utility units, specify heavy-duty air-cooled Wisconsin Engines. Sizes from 3 to 56 hp. Electric starting available for all models. Write for Bulletin S-251

J-224

WISCONSIN-POWERED rigs are widely used for exploration drilling in the coastal areas of Texas. They are capable of drilling 350-ft. core holes in any location that is accessible by truck or tractor.

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BLOWOUT PREVENTERS
for Bolivian Airborne Operations

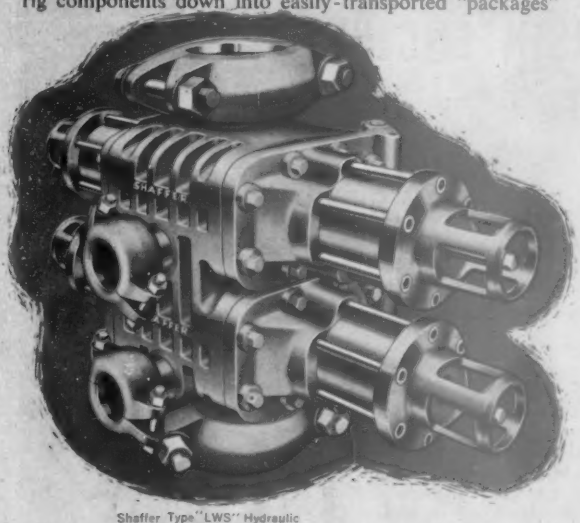
A joint venture of Bolivia California Petroleum Company, a subsidiary of Standard Oil Company of California, and Compania Petrolera Boliviana Shell, Ltd., one of the Royal Dutch-Shell group of companies, formed to carry out an extensive exploration program in the interior of Bolivia, South America, has attracted widespread interest because of the unique manner in which the program is to be developed.

A complete drilling rig—especially-designed for *airborne* exploratory drilling operations—has been built for Loffland Brothers de Caracas, C. A., the drilling contractor who will supply personnel, rig, camp, transportation and construction facilities for the program.

The airborne nature of the operations was decided upon only after careful evaluations to determine the most efficient and economical method of reaching the proposed development area. Roads are virtually non-existent and the area is subject to seasonal flooding that further complicates operations.

Lightweight, Easily-Transported Units

Key to the airborne program has been breaking the normal rig components down into easily-transported "packages"



Shaffer Type "LWS" Hydraulic Double Blowout Preventer 6" – Series 1500

that weigh no more than 4000 pounds each (for helicopter transport) and are no larger than 8′ x 8′ x 28′ (for cargo plane handling).

To avoid complex assembly problems at the rig-site, it was decided that blowout prevention equipment should be transportable as a complete unit, if possible—an assignment that posed major difficulties because normally-used blowout preventers with the required pressure rating weigh some 5700 pounds per unit, well above the 4000-pound weight limitation.

It was Shaffer—already experienced in the field of lightweight pressure control equipment through development of its Type "LWS" Blowout Preventers—that came up with the solution. . .

▶ **A new 6"—Series 1500 Shaffer Type "LWS" *Double* Blowout Preventer unit with 7-1/16" Bore and 5000 PSI *Working* Pressure (10,000 PSI *Test* Pressure) that weighs only 2610 pounds, complete!**

This Preventer has all the features and pressure-handling abilities of equipment weighing over 5700 pounds—yet weighs *less than half as much!*

▶ **Another Shaffer Type "LWS" *Single* Blowout Preventer developed for this project (a 10"—Series 900 Gate) has an 11" Bore, a 3000 PSI *Working* Pressure (6000 PSI *Test* Pressure)—all with a *total* weight of 2100 pounds (compared with the almost 4000 pound weight of comparable equipment heretofore available)!**

Full Range of Features

These new Shaffer developments are, in no sense, "stripped down" versions of heavier equipment. They are a continuation of the Shaffer program of developing lightweight, high-pressure Blowout Preventers and include all the well-known Shaffer advancements such as **"Swinging END-Opening" Doors** for quick, easy ram changes... **Positive "In-Line" Ram and Piston Design** that eliminates yokes, levers and other complicated assemblies... **Completely Enclosed Design** with no exposed operating parts... *and many other features found only in Shaffer Preventers.*

QUICK FACTS on New Shaffer Type "LWS" Gates

API Size	Bore	Working Pressure	Test Pressure	Weight, Complete
6"—Series 1500 "Double" Gate	7 1/16"	5,000 PSI	10,000 PSI	2,610 lbs.*
10"—Series 900 "Single" Gate	11"	3,000 PSI	6,000 PSI	2,100 lbs.**

***A 55% saving in weight,** compared with normally-used equipment.
****A 46% saving in weight,** compared with normally-used equipment.

The new Shaffer Type "LWS" Preventers are available with Studded Flanges or Bolted Flanges... or with Hubs for Clamp-Ring Connections. They are also available with a wide selection of outlets!

Important
Transportation Savings!

If your drilling operations involve considerable transportation of equipment, it will pay you to investigate these new Shaffer Type "LWS" Preventers for *your* operations. In many cases, savings in transportation cost *alone* will more than pay the moderate cost of equipment!

See your nearest Shaffer representative for complete details on Shaffer's new Type "LWS" Preventers. Or write direct!

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Zone 1, NTSI Map 94-0-6. The Deer Lake well was drilled by Pan Am on a spread of 203,920 acres acquired under farmout agreement from British Columbia Oil Lands Ltd. This farmout which covers B.C. Permit 322, is subject to a 12½ % carried interest to B.C. Oil Lands and a 2½ % override royalty to Fargo Oils.

The Deer Lake wildcat went to 11,056 ft. Production casing was set at 10,783 ft. The gas pay is believed to be Slave Point Devonian, topped at 9,618 ft. Porosity came at 9,670 ft. Perforations were at 9,705-25 ft. The Komi gas area lies 40 miles southeast.

Helium search slated in Petrified Forest

Six wildcats ranging from 1,200 to 2,800 ft. in depth will be drilled in Arizona's Petrified Forest-Pinta Dome area in a search for helium.

Three operators are involved in the program. Four of the wells will be drilled by Sierra Drilling Corp., and one each by Crest Oil Co., and Layron E. Wilson. The four Sierra wells will be 1,300-ft. tests. The Crest well will go to 1,200 ft., and the Wilson well to 2,800 ft.

All six wells will be drilled in Apache County near U. S. Highway 66. Rotary tools will be used on the wells.

Prolific offset well in Kansas flows St. Louis oil

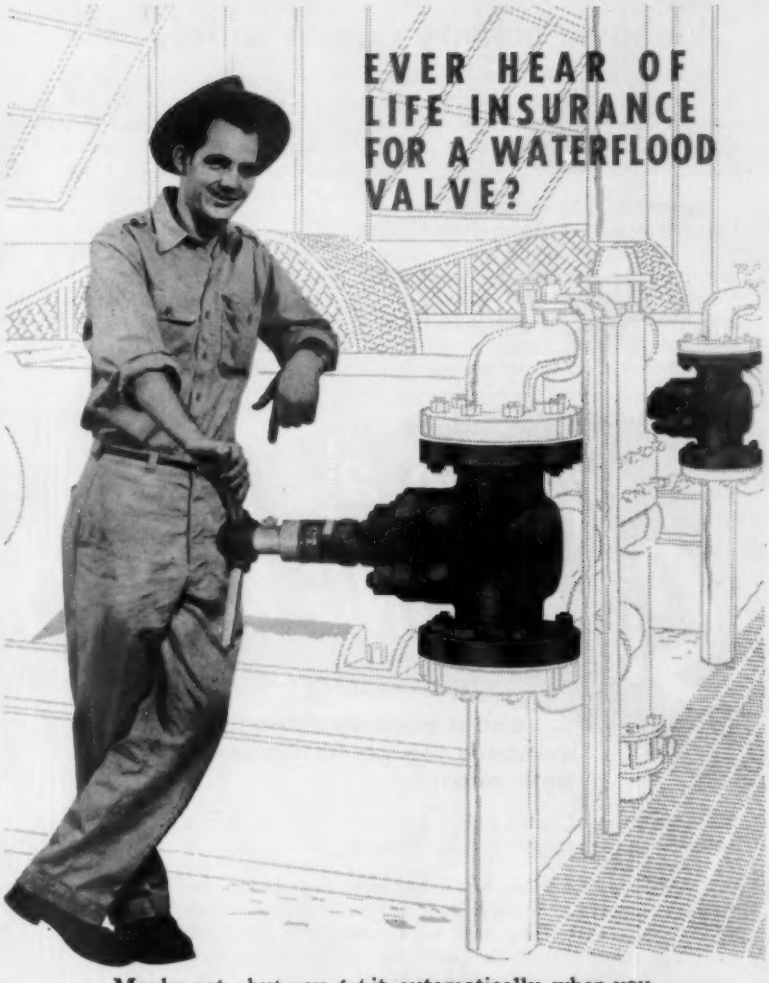
A big potential is reported at the northeast offset well to the lone producer in South Kismet field, southeastern Seward County, southwest Kansas.

The Panhandle Development Co. 1 Frederick in C SW NE 26-33s-31w flowed 714 bbl. of oil daily from perforations in the St. Louis Mississippian at 5,542-90 ft. The well also had 10,000 M.c.f.d. from the Morrow Pennsylvanian.

Two Southwest Kansas discoveries reported

Operators are awaiting potential at two gas discoveries in Seward County, southwestern Kansas. Anadarko Production Co. 1 Davies, a Mississippian find in C NW 36-33s-32w, gaged 3,195 M.c.f.d. from perforations at 5,762-69 ft. and is shut in. This pool opener is 6 miles southwest of Kismet and 4 miles southwest of Kismet Multipay field.

Petroleum, Inc., 1 Doven, C SW 1-32s-32w, 8 miles northwest of Kismet, flowed 1,020 M.c.f.d. from Morrow Pennsylvanian at 5,572-5,608 ft. This well is 3½ miles northwest of West Plains field.



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Countless troublefree installations have proved this versatile valve's rugged performance under the most difficult waterflood conditions. Why not let the Demco Valve's "life insurance" work for you, too?

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Oklahoma activity ranges widely

OKLAHOMA'S fast-moving exploratory and development campaign brought newsmakers from Woods County in the northwest to McIntosh County in the southeast.

Northwest. Ashland Oil & Refining Co. completed the discovery well of a new Tonkawa Pennsylvanian sand gas pool near Freedom in Woods County. The 1 Gerloff, C NW SE 27-27n-18w, flowed 7,770 M.c.f.d. from 4,800-06 ft., open flow.

In Beaver County, Oklahoma Panhandle, Vickers Petroleum Co. completed 1 Neufeld in C SW NE 11-1n-21eCM, as a lower Morrow Pennsylvanian gas-condensate discovery. The well flowed 1,100 M.c.f.d. and 7 bbl. condensate from perforations at 7,776-98 ft.

Central. Another new field was opened in booming Kingfisher County at Marion Oil Co. 1 Cooper, C SW SW 1-19n-6w, northeast of East Hennessey field.

The well flowed 78 bbl. of 40°-gravity oil in 6 hours through 20/64-in. choke from Manning Mississippian and Meramec. The Manning was perforated at 6,348-62 and 6,370-77 ft. The rate here per day was 312 bbl. The Meramec was good for 223 bbl. of 40°-gravity in 6 hours through 20/64-in. choke through open hole at 6,567-6,625 ft., or 892 bbl. per day. The operator has staked 2 Cooper in C NE SW 1-19n-6w.

South-central. The Second Bromide Ordovician sand paid off at Sunray Mid-Continent Oil Co. 1 Lindley in C SE NW 32-6n--2w, in the east extension area of McClain County's Flint Creek field. The well flowed oil during tests at 10,102-10,124 ft.

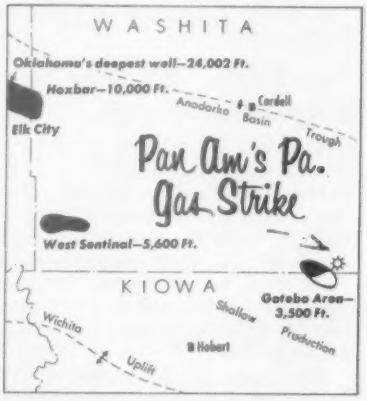
A new zone was opened at An-Son Petroleum Co. 1 Mantooth in C NW NW 7-5n-3w, inside one-well Northwest Payne field in McClain County. The well flowed 156 bbl. of oil in 9½ hours through ½-in. choke from perforations at 9,996-10,008 ft. in Hunton Siluro-Devonian. This pool was opened by Sinclair Oil & Gas Co. at 1 Wacker in SW NE NE 12-5n-4w for 106 bbl. per day from Hart sand at 8,800-32 ft. through 10/64-in. choke.

The Sunray 1 Watson in C SE SW 6-5n-2w flowed 62 bbl. of new oil in 10 hours through ¼-in. choke from Hunton at 7,870-90 ft.

Oklahoma registers an important discovery

ONE OF THE most important discoveries in southwestern Oklahoma in some time is Pan American Petroleum Co. 1 State in 36-8n-16w, 6 miles northwest of the town of Mountain Vitw and 12 miles southeast of Cordell in Washita County.

Recovery of gas was at the esti-



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2. OIL STATES technology has produced many advances in swab design which have become standards throughout the industry.

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Photo: Petroleum Engineers Frank E. McGonagill, Jr., (right), Vice President and Herbert F. Poyner, Jr., Assistant Vice President, inspect a gasoline plant, one of the major oil activities financed by Bank of the Southwest.

MEMBER F.D.I.C.

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As an alternate to the torque record, a hydraulic system can be used to measure pump pressure, which provides an accurate reading on the actual pressure in the mud system, variations in pressure caused by equipment performance or changes in the mud system.

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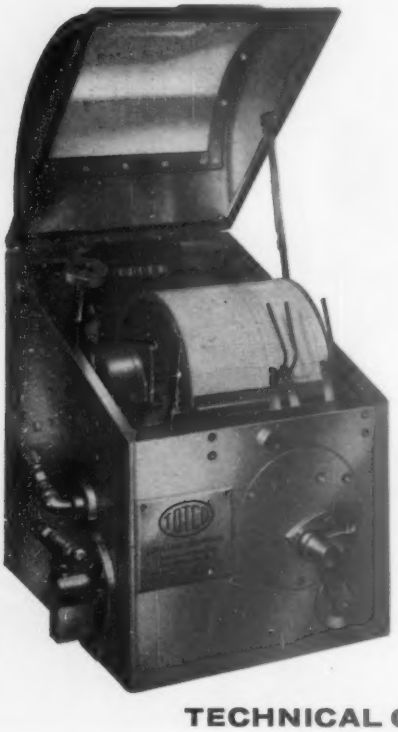

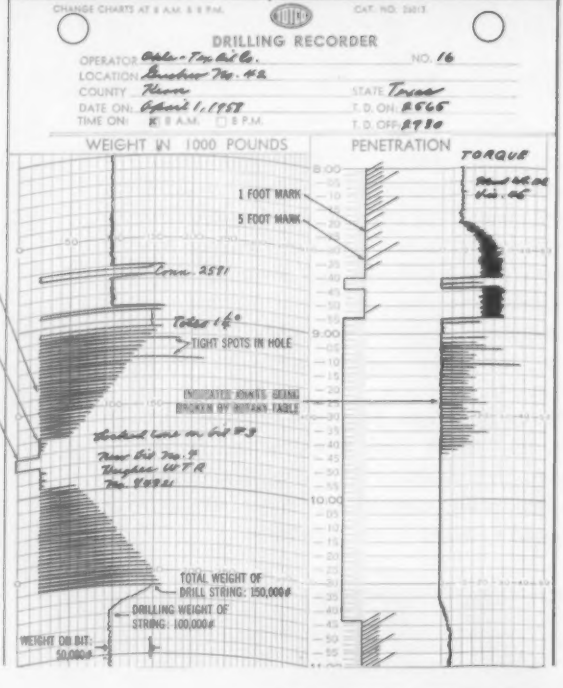

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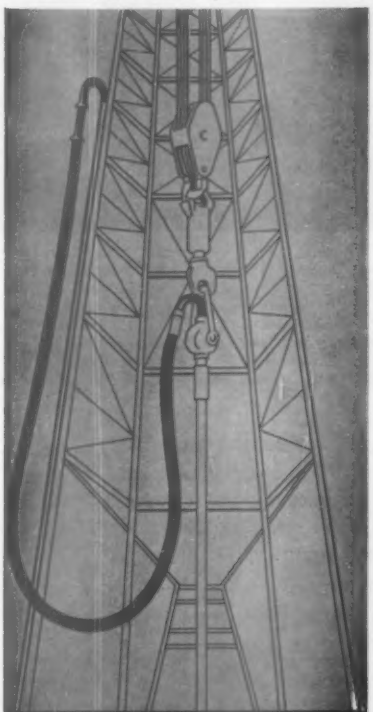

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mated rate of 16,000 M.c.f.d. on test of an unnamed section of the Pennsylvanian at 8,489-8,533 ft. Top of pay was 8,492 ft. Choke was 5/8-in. The operator plans to drill ahead from total depth of 8,533 ft. to 12,000 ft.

Location of the new gasser is in the midst of shallow to 3,000-ft. production on the highly complex northern flank of the Wichita Mountain uplift on the south side of Anadarko basin.

Tertiary gas flows at Red Wash well in Utah

An outpost well at Red Wash field in Uintah County, northeastern Utah, flowed 8,490 M.c.f.d. from Wasatch Tertiary at 5,328-35 and 5,392-98 ft. The discovery is Texaco Inc. 1 Prince, SW SW 10-7s-24e.

The well is now shut in. It is located about 1 mile east of oil production in the northeast corner of this field and about 1 mile north of gas production. Flow was through 3/4-in. choke at the Texaco find.

Nebraska gets two workover discoveries

THE PENNSYLVANIAN exploratory wave in southern Nebraska's Redwillow and Hitchcock counties continues to move forward with two new discoveries completed. Both wells were workovers.

In Redwillow County, 1¼ miles south of Ackman field, Burch Drilling Co. 1 Winter is a new Lansing-Kansas City producer in C NW SE 27-2n-28w. The well was completed pumping 120 bbl. of oil daily from perforations at 3,358-59 ft. Another wildcat ½ mile east at Excelsior Oil Co. and Joe Rothmeier 1 Cashen, C NW SW 26-2n-28w, is testing in the same zone after finding oil shows on four drill-stem tests between 3,309 and 3,520 ft.

Second discovery. The second new find from an old workover well is in Hitchcock County at John Luccous 1 Bose in C SE NE 34-1n-34w. This well pumped 48 bbl. of oil per day from Lansing-Kansas City perforations at 4,060-64 ft. Nearest oil is at Cahoj across the line in Rawlins County, northwestern Kansas. Nearest Nebraska oil is at Reiher field, 10 miles east. Both the new strikes were former British-American Oil Producing Co. holes.

The new discovery well drilled by Murfin Drilling Co. at Sleepy Hollow, in Redwillow County, has been gaged at 144 bbl. of oil daily after being placed on the pump. Its pay is perforated at 3,418-25 ft.

NEW ECONOMY
In Payne Automatic Pump Accumulator Units for Blow-Out Preventer Operation

The new Payne Type "E" automatic pump accumulator unit has solved three basic problems confronting drillers today – increased safety, easier handling and reduced cost.

Because the Payne non-separator type accumulators need not be removed for field service, they are used as vertical structural members of the unit, welded in place on the skids as the main sections of the assembly.

The Type "E" design produces a much stronger arrangement which remains in perfect balance. In transportation and rig placement this new center of gravity simplifies all handling procedures.

Payne Type "E" Automatic Pump Accumulator Units are available in all popular sizes from 20 to 80 gallons with Payne Two-Stage-Double-Acting-Pump and Automatic Unloading Valve.

Fluid control manifolds are supplied with 3" 3000 psi W.P. stainless steel Ramlok 4-way valves. Automatic controls and pumps are protected by steel covers, heavy duty skids and lifting eye are provided for safe handling.

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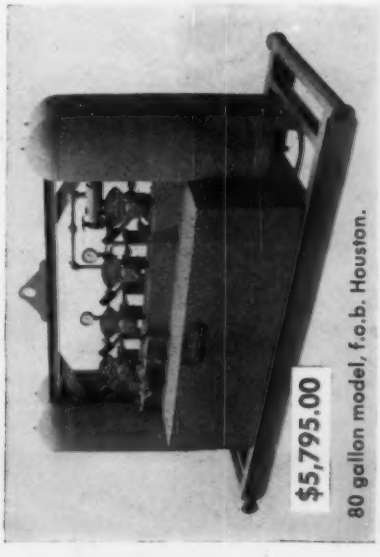

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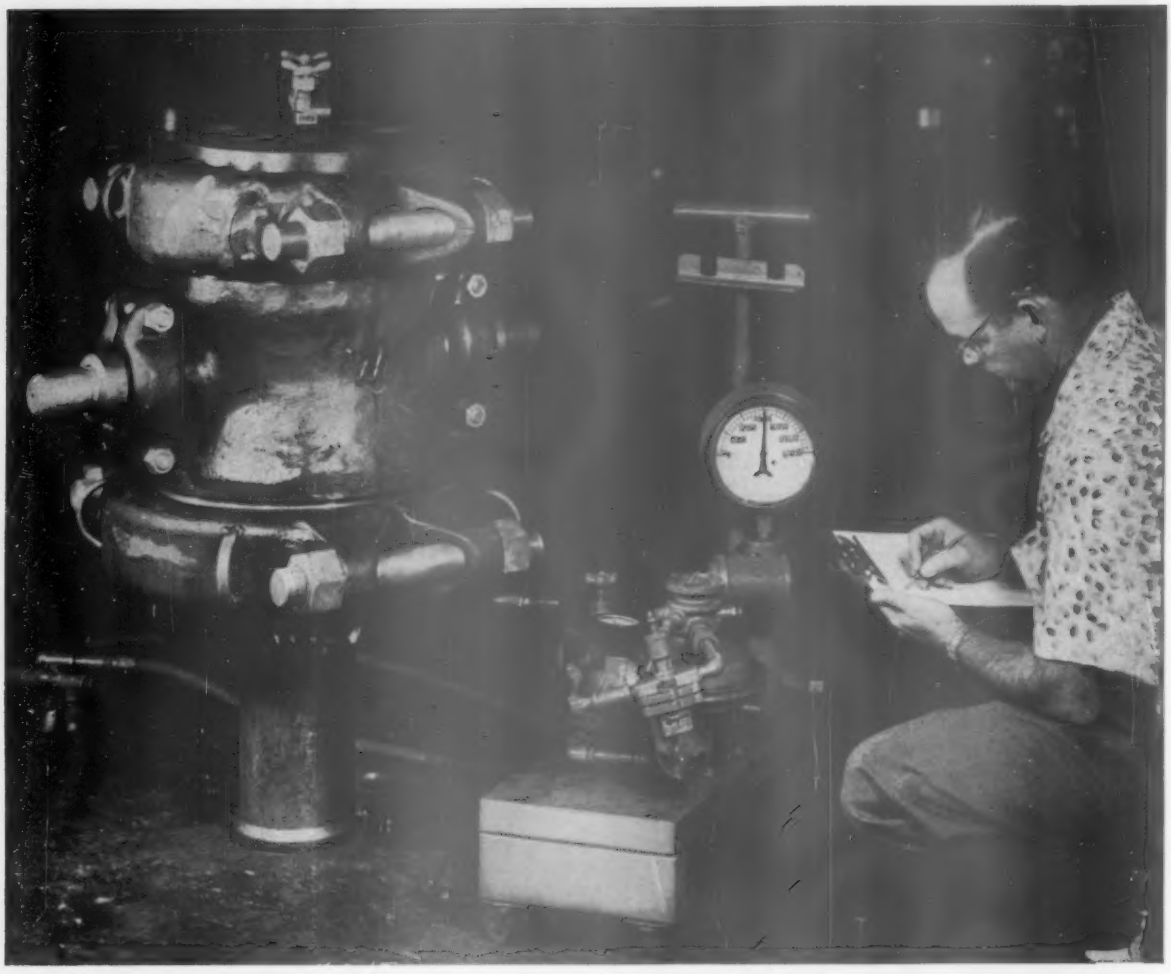
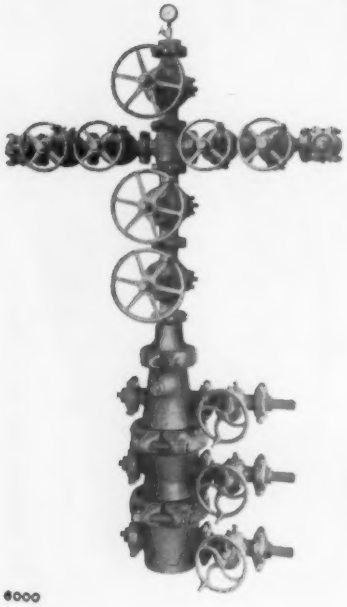


Another Step In...



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Nebraska's Denver basin records two new finds

Two discoveries were completed in the area east of prolific Willson Ranch field, Banner County, Nebraska. The two new finds are in Cheyenne and Morrill counties.

Baumgartner Oil Co. and Falcon-Seaboard Drilling Co. 1 Willson Ranch-A, C NW SW 8-17n-52w, Morrill County, pumped 512 bbl. of oil daily from "J" sand perforations at 5,110-12 ft.

In Cheyenne County, 2½ miles east of South Willson Ranch field, the same group completed 1 Willson Ranch-B in C NW SE 20-17n-52w, Cheyenne County, pumped 145 bbl. of oil daily from "J" sand perforations at 5,343-53 ft.

A third well in this area, the 2 Willson Ranch-A in C SE NE 17-17n-52w, Morrill County, swabbed 12 bbl. oil per hour from "J" sand at 5,125-26 ft. Pumping equipment is being set up here. This well is ½ mile northeast of the recent "J" sand discovery of British - American Oil Producing Co. at 1 Nebraska-H in C NE SW 16-17n-52w. That well pumped 262 bbl. of oil daily from 5,230-34 ft.

Boone Mountain pool in Keystone State activity

IN PENNSYLVANIA, most of the deep-well completions in June were in Boone Mountain pool, Clearfield County. There were 11 completions here, 8 of which produced gas. The largest of these producers was the New York State Natural Gas Co. 2 Hopkins. It made 21,852 M.c.f.d. open flow after fracture. Rock pressure was 3,840 psi. Pay is the Onondaga chert-Oriskany sandstone. The smallest open flow of the eight wells was 6,000 M.c.f.d.

• Worldwide Petroleum Co. completed two gas wells in Silurian in Erie County. The only other completion during the month was Robert Snyder 1 in Somerset County, drilled by Felmont Oil Corp. The well is a stepout of about 1½ miles west of Boswell Dome field. Initial production was 1,572 M.c.f.d. after fracture with rock pressure at 3,243 psi. in 44 hours. Production is from the Onondaga chert-Oriskany sand interval.

• Four wildcats now operating in Pennsylvania are of considerable interest. The Hillbish well in Northumberland County is drilling at 3,953 ft. The Venango County deep test on the Burkhardt farm is drilling at 1,600 ft. Benedum-Trees' wildcat in Washington County is drilling at 40 ft. A joint venture by Peoples Gas Co. and Snee-Eberly is being drilled on the east flank of South Summit pool in Fayette County. This one is drilling ahead at 3,300 ft.

Arkoma basin field adds new gas producer in Haskell

Haskell County, Southeast Oklahoma, center of the drilling spree in the Arkoma basin, got another producer. Apache Oil Corp. completed the fourth well in Northwest Kinta field at 1 Howard, C SW NE 22-8n-19e, flowing 6,640 M.c.f.d. through 34/64-in. choke from basal Atoka Pennsylvanian sands from perforations at 5,836 to 5,894 ft.

Biehl is new pay for Posey County, Indiana, area

The Biehl sand at 1,498-1,519 ft. is a new pay for the area 6 miles west of Evansville in Posey County, southwestern Indiana.

Discovery well is Mayhew Oil Co. 1 George Hast in SE SE SW 2-7s-12w. The well recovered 1,500 ft. of clean oil on tests. Location is ½ mile southwest of production in Heusler pool.

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JENSEN JACKS have grown up with the oil industry. For over 40 years—since 1919—JENSEN has been manufacturing rugged, dependable jacks like this big Model 16 Rotary Balanced Unit operating in Oklahoma. They cut operation cost for successful producers wherever oil is found.

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JENSEN JACKS

usi Axelson PUMPING NEWS

Rising Costs Increase Use of On-or-Off Attachment

Saves Stripping Jobs. For over 20 years operators have been using the Axelson On-or-Off attachment as a safety joint to protect the rod string investment in sandy wells. It is impossible to estimate how many stripping jobs this attachment has prevented, or how many tens of thousands of dollars it has saved producers over that period of time.

After Sand-Fracing. In many sections of the oil country, it has become standard practice to install the On-or-Off attachment whenever a pump is run after a sand-frac job, because of the severe sanding up which may occur.

Reports from the field give many other uses of the On-or-Off attachment. For example:

Two-Zone Pumping. In West Texas the attachment is being used on practically every two-zone pump installation. Its use allows the pump to be run on the tubing, as a safety factor. It also insures proper spacing and seating of the pump.

Running Insert Pump. The On-or-Off tool is frequently employed when running a long insert pump through tubing to guard against the possibility of a stripping job if the pump becomes stuck in a tight spot.

High Water Cut Wells. Another cost-cutting application of the On-or-Off attachment is in wells where increasing water encroachment compels greater fluid lift for economical production. With the attachment, larger bore pumps can be used without going to larger size tubing or having to run the rods and tubing together. For instance, a 2½" TL pump can be used on 2" tubing, or a 4" pump on 2½" tubing. In the same type of application, the On-or-Off attachment can be used with a casing pump.

Easier Paraffin Removal. Wells with moderate paraffin conditions often handle the problem by installing paraffin knives or a series of scrapers above the On-or-Off attachment. This allows the rod string to be released, paraffin removed and the string re-set, all without unseating the pump.

Ask your Axelson representative to show you how the exclusive positive load action of the On-or-Off attachment keeps the threads shouldered at all times for positive seal. The attachment also has a self-centering action. Only ¼ turn rotation is needed to release, and both engagement and disengagement are positive. When engaged, the unit is as solid as a one-piece coupling, and foreign matter cannot enter.

How to Select the Proper Polished Rod

The one right polished rod for any pumping job is the one which best combines required strength and wearing qualities at lowest cost. Since no single material can do this under all conditions, Axelson supplies a complete line of polished rods of different metals and characteristics.

For light service #55 rods of cold-drawn carbon steel are usually recommended.

Medium service indicates #60 rods of medium carbon steel.

For normal to heavy service, alloy steel specially treated is used in #59 rods.

For special conditions involving severe corrosion and/or abrasion, Axelson polished rods are available in bronze, stainless steel, Axtrahard hard-faced, and chromium-plated.

"Triple-H" Polished Rods. These are an example of the new materials which Axelson research is developing. "Triple-H" polished rods are currently available in two lengths for the 26-foot and 31-foot Hydrax Pumping Units. This rod is made from a special stainless steel alloy, precipitation-hardened to a Rockwell C reading of about 40. It is extremely resistant to both abrasion and corrosion, and has a tensile strength of approximately 110,000 psi minimum yield.

"Triple-H" rods have seen wide use, particularly in West Texas wells where corrosion is severe and abrasion has always been a problem. "Triple-H" rods have been carefully inspected after two years continuous service under these difficult conditions, and no measurable wear, corrosion or metal fatigue has been found. The conclusion is definite that "Triple-H" polished rods outwear and outperform all others under severe conditions.

"Triple-H" rods are held to finish tolerances of less than .003"—a necessity with the high-pressure seals of hydraulic pumping units.

The maximum straightness and finer finish of all Axelson polished rods pays off at the well head in lowest possible friction losses for longer rod and packing life and reduced downtime.

Packing also is important for best service, and should be carefully chosen. Marlo packing cuts costs and friction both, because its special semi-metallic inserts form a smooth, resilient bearing-like surface which stands up in heavy service and will not harden or burn during pumpoff.

Your Axelson representative is qualified to recommend the combination of polished rod and Marlo packing which will give you greatest service with long term economy.

Tests show that the surface of an Axelson polished rod is measurably smoother than that of ordinary milled-finish rods. Axelson creates this finish by centerless grinding—a more expensive method, but the only one which will finish to Axelson specifications. In addition, close tolerances are held throughout manufacture to insure maximum straightness.

Mercedes area gets first quadruple

FOUR ZONES of an extension well in the Mercedes area of Hidalgo County, in Texas' Rio Grande Valley, have a combined open-flow potential of 66,050 M.c.f. of gas daily. One zone also is rich in condensate with a recovery of 220 bbl. per 1,000 M.c.f.

The well, 1-A Flora Teasdale, drilled to 10,244 ft. by A. W. Gregg, will be the first quadruple completion in the area. Two of the zones are new pays in the multiple-sand field.

The rich condensate flow is from the area's 7,400-ft. sand, perforated at 7,438-68 ft. Gas tested for an open-flow potential of 15,000 M.c.f. daily with gas-liquid ratio of 4,500 cu. ft. per barrel. Flowing pressure through ¼-in. choke was 1,894 psi.

A shallower zone, perforated at 7,134-46 ft., tested 1,050 M.c.f. daily, open-flow, yielding 55 bbl. of 56°-gravity condensate per 1,000 M.c.f. Flowing pressure through ¼-in. choke was 640 psi.

New pays opened are at 7,500 ft. and 8,300 ft. depths. The former, perforated at 7,550 ft., is good for 38,000 M.c.f. of gas daily with 26 bbl. of 65.6°-gravity condensate per 1,000 M.c.f. of gas. Flowing pressure through ¼-in. choke was 2,518 psi.

The other new pay, the lowermost for the well, is perforated at 8,332-65 ft. Open-flow potential is 12,000 M.c.f. daily with 10 bbl. of 53.4°-gravity condensate per 1,000 M.c.f. Through its 1.4-in. choke, pressure was 2,525 psi.

The new well is only 150 ft. from a well recently completed in three other zones, making a total of seven producing zones in the two wells. Pays of the triply completed well are at 8,200 ft., 8,000 ft., and 7,900 ft.

Texas Panhandle records another Morrow discovery

Morrow exploration in the Texas Panhandle uncovered another gas pool for Lipscomb County. Discovery well is Ridgmorr Oil Co. 1 J. A. Guipel in the east-central part of the county.

The operator reported a calculated open flow of 2,200 M.c.f.d. from perforations in the Morrow Pennsylvanian at 9,743-51 ft. Location is in Section 799, Block 43, H&TC Survey, 6 miles south of Follett and 4 miles north of Lipscomb field, nearest Morrow gas production.

Ochiltree find. Ridgeway & Morrison completed 1-37 Banner-Gregg, 2 miles east of Share upper Morrow and Twin Des Moines field in Ochiltree County.

The well flowed 5,400 M.c.f.d. on calculated open flow test. Perforations were at 8,231-39 ft. in lower Morrow.

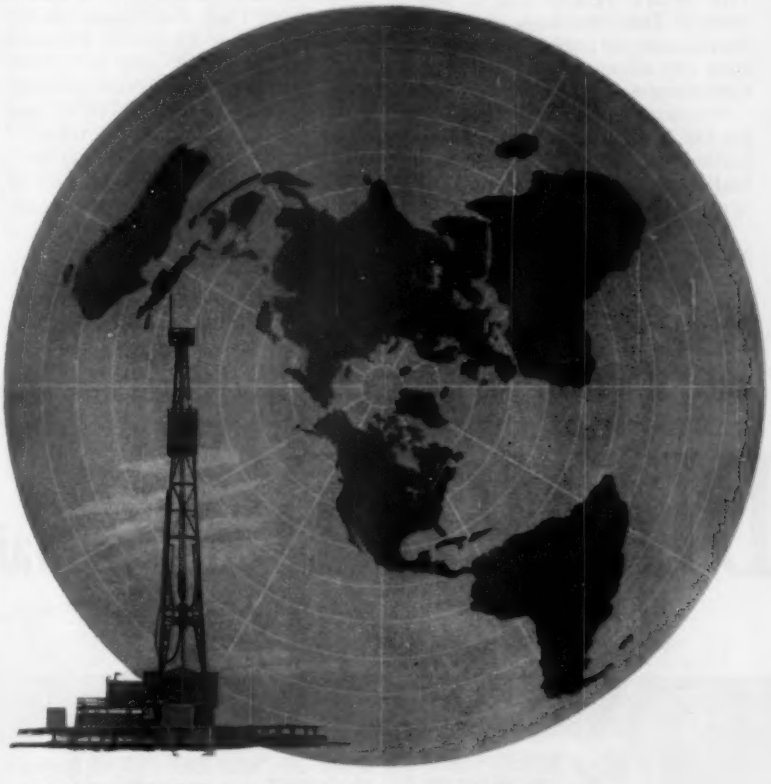
Rich condensate well in old Normanna field

An exceptionally rich condensate well has been completed in the Normanna Wilcox field, in Bee County of Texas' central coastal region.

The flow is from the Second Massive Wilcox sand, the deeper of the two zones from which the well is productive. Pay is perforated at 9,490-9,329 ft.

The well, with open-flow potential rating of 36 M.M.c.f.d. of gas, has a gas-liquid ratio from that zone of 6,075 cu. ft. per bbl. Liquid (51.6°-gravity condensate) yield is more than 165 bbl. per 1 M.M.c.f., or about 5,940 bbl. per day.

The upper zone is the Wilcox-Luling sand, perforated at 8,901-48 ft. It tested for open-flow potential of 19,200 M.c.f. of gas with gas-



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liquid ratio of 11,758 cu. ft. per bbl. Gravity of the liquid is 53.2°.

Shut-in pressures of the two zones are 5,126 psi. and 4,397 psi., respectively.

The well was drilled by Dudley T. Dougherty as his 1 Hicks Gas Unit 1V. It is in the Holman George Survey, a mile southwest of Normanna. Richest condensate yields in Normanna's Wilcox field previously had been around 100 bbl. per 1 M.M.c.f.

Delaware basin gets gas discovery

THE WEST TEXAS side of much-watched Delaware basin has a new gas discovery in a wildcat far removed from any other production in central Culbertson County.

The discovery is by Socony Mobil Oil Co., Inc., at its 1 State-Barrett, in Section 18, Block 63, T-2, in the T&P Survey, 12 miles east of Pine Springs.

Gas is from Pennsylvanian sand, perforated at 5,878-87 ft. After acidizing, the well flowed at the rate of 422 M.c.f. daily through 8/64-in. choke. Calculated open-flow potential is 2,500 M.c.f. daily.

Open-hole drill-stem tests of the sand at 5,838-5,955 ft. had resulted in a flow of 549 M.c.f. daily through 5/32-in. choke.

Sulfur water was tested with the gas at the rate of 208 bbl. per 1,000 M.c.f.

Completion in the 5,800-ft. Pennsylvanian sand comes after drilling the hole to a total depth of 9,578 ft. Operators had planned to go to 10,000 ft.

Gas discovery scored for Hidalgo County

A gas-discovery by Shell Oil Co. is turning new interest on Texas' sparsely explored most southeastern county.

Shell's new well, 1 J. W. Lutes, is offshore in Tract 654 Laguna Madre, 10 miles east of La Leona, Cameron County. It is rated good for 24,000 M.c.f. of gas daily from Miocene sand, perforated at 6,694-6,710 ft. and 6,720-28 ft. There was a trace of 52.2°-gravity condensate during tests.

Location is 2 miles southwest of Three Islands field, farther offshore in Laguna Madre. Three Islands is one of only seven scattered fields which have been found in the county. All are productive of gas, and, except for Three Islands, and the Lacy area extension on the Hidalgo County line, none has more than two wells.

Flow of Shell's well through 20/64-in. choke was at the rate of 6,353 M.c.f. daily with pressure of 2,408 psi. Shut-in pressure is 2,672 psi.

Hole had been drilled to 10,520 ft.

West Texas field gets discovery approval

A recent Montoya Ordovician oil discovery in Pecos County, West Texas, has been given new-field status. Name is Pecos Valley, South Montoya field. Discovery well was El Cinco Production Co. Ltd. 1-C C. A. Atkins in Section 26, Block 10, H&GN Survey.

The well flowed 434 bbl. of oil daily through 16/64-in. choke from perforations at 5,202-62 ft. Nearest Montoya production is 14 miles northeast at Abell Silurian-Montoya Ordovician field. Nearest production is 2,700 ft. northeast at Pecos Valley, South Ellenburger field.

Borden approval. Trice Production Co. 1 Bert Dennis, new Mississippian discovery in northern Borden County, 5 miles northeast of Gail, pumped 210 bbl. of oil per day from perforations at 8,315-70 ft. Nearest comparable oil is about 15 miles west of Fluvanna. The well lies 1 mile southwest of Rafter Cross field.

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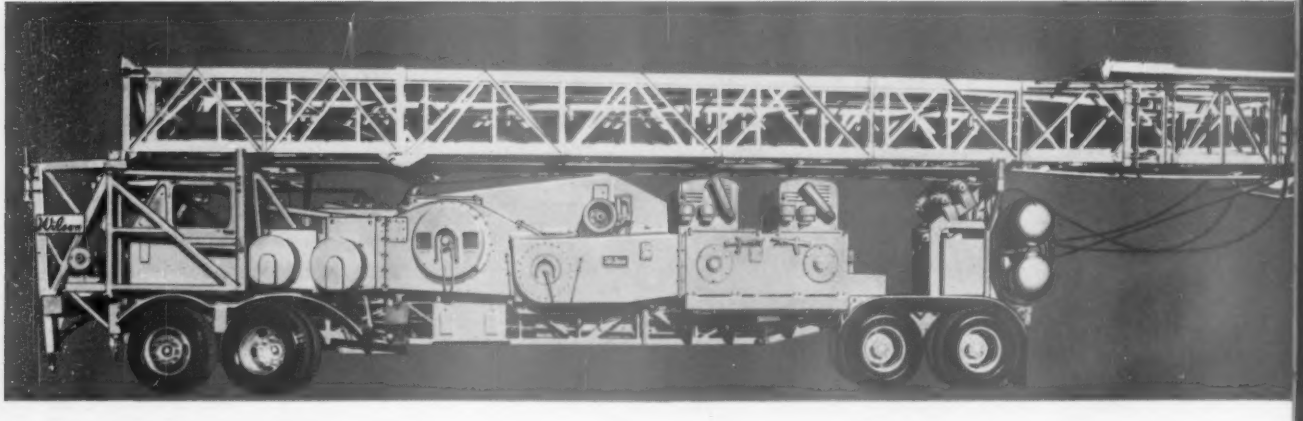

Chapel Hill productive area is extended

Production has moved a mile northwestward and across a fault from Chapel Hill field in central Smith County, East Texas, where Texaco Inc. has completed a good gas-condensate well in Paluxy sand at 5,910-18 ft. and 5,924-30 ft.

The new area is being designated as West Chapel Hill field. Texaco's discovery well, 1 Theotis Warren Gas Unit, flowed 2,500 M.c.f. per day through ¼-in. choke with pressure of 1,750 psi. Gas carried 69 bbl. of 69.3°-gravity condensate per M.M.c.f. Calculated open-flow gas potential is 28,000 M.c.f. daily.

Texaco drilled the well to 8,290 ft. where bottom was in the Travis Peak formation. Location is 7½ miles east of Tyler in the John H. Brock Survey.

Taylor County, Texas, adds new Gardner sand reservoir

The Middle Gardner sand is producing at a new field in south-central Taylor County, North Texas. Discovery well is A. V. Jones & Sons 2 H. M. Allen in the R. C. Lyons Survey, 6 miles west of Bradshaw.

This new pool opener flowed 146 bbl. of oil daily on 10/64-in. choke from perforations at 4,694-4,706 ft. Gravity is 41.5°. Gas-oil ratio is 1120:1. Nearest Gardner sand oil is in Sanrob field 5,800 ft. northeast. Nearest production is from Fry sand at Andra field 4,500 ft. northeast. The new field will be called Drasco Middle Gardner.

Wyoming confirmation flows Muddy oil

The confirmation well to O'Connor field in Campbell County, Powder River basin, northeastern Wyoming, pumped 145 bbl. of oil daily from Muddy at 5,972 ft. This well is Pan American Petroleum Corp. 1 O'Connor-B in C SW SW 29-52n-69w. It is the southeast extension to Davois Oil Co. 1 O'Connor in C NE SE 30-52n-69w, a June discovery that pumped 295 bbl. of oil per day from Muddy Cretaceous sand at 5,975-6,014 ft.

Two-volume yearbook available from Rinehart

A statistical and graphical summary of 1959 well information, compiled and edited by the staff of Rinehart Oil News Co.'s special-publications department, is available from that company. The Yearbook 1960 comes in two volumes. It covers the entire oil country from Nevada east, and also includes the Williston-basin portion of Canada. This complete volume of drilling data can be ordered from Rinehart Oil News Co., Box 1208, Dallas 21.

Another Cotton Valley find in old Tundra area

East Texas' spreading Jurassic play has resulted in another Cotton Valley discovery, a deep well in the old Tundra area of southern Van Zandt County.

The new discovery well, a joint operation of Pure Oil Co. and Texaco Inc., flowed 242 bbl. of 47.7°-gravity oil per day on completion tests through 24/64-in. choke. Gas-oil ratio was 1,127 cu. ft. per barrel with flowing pressure of 125 psi.

Its Cotton Valley pay is perforated at 10,676-82 ft. Hole was drilled to 14,750 ft., stopping in salt.

The Tundra area is 7 miles west of Martins Mill. Original discovery well, productive from Cretaceous-Rodessa sand at 8,150 ft., was completed late in 1944. It has been the only well until now. The area has been inactive since 1956.

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Mogul "42" Winchmobile, built by Wilson Manufacturing Company, Wichita Falls, Texas has a rated capacity of 16,000 feet, using 2½-inch tubing. Thoroughly dependable *power transmission* is required to operate at this depth. That's why DIAMOND Roller Chains are used exclusively in Winchmobile transmissions. Wilson knows from long experience that DIAMOND's capacity for shock and peak loads . . . its resistance to wear, and its dimensional stability, contribute substantially to the efficiency and low operating cost of Wilson equipment.

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Louisiana offshore test logs 10 sands

TEN SEPARATE SANDS with a total of 202 ft. of net pay were logged between 8,300 and 12,300 ft. in a long outpost well drilled by Gulf Oil Corp. on the south flank of the giant South Timbalier Block 135 salt-dome field, more than 30 miles off the coast of Louisiana in the Gulf of Mexico.

The well, D-5 OCS 0463, in Block 151, is a mile southwest of Gulf's D-4 well which had 91 ft. of net oil sand between 9,600 and 10,950 ft. after drilling through a thick salt overhang it discovered.

The D-4 well was completed in three zones with a total initial production through small chokes of 1,169 bbl. daily. The D-5 well, drilled to 12,339, has started testing. First and deepest zone to be tested is perforated at 12,304-20 ft.

The three completion zones in the D-4 well have their respective perforations at 10,919-27 ft., 10,578-98 ft., and 10,488-10,508 ft. The deepest produced at the rate of 438 bbl. daily through 8/64-in. choke; the middle zone 398 bbl. daily, also through 8/64-in. choke; and the uppermost zone 333 bbl. daily through 7/8-in. choke. Gas-oil ratios ranged from 1,305 to 1,230 cu. ft. per barrel. Oil gravities were 29° to 29.9°.

The dome, discovered in 1956, has been one of the most productive of Louisiana's offshore fields. The recent discovery of the overhang by Gulf's D-4 well has been one of the most significant developments in the new extension exploration on the dome's south flank. It leads the way to possible and probable still more prolific production.

Presence of the overhang had been suspected in reflection-seismograph work before the D-4 well was drilled. Also by shooting work with a geophone placed in an earlier hole drilled far out on the flank of the dome, geophysicists had mapped a profile of the indicated overhang. Profiling apparently was so accurate that the D-4 well drilled through the salt within 180 ft. of the predicted depth. It penetrated 3,471 ft., of salt, entering at 5,479 ft., and coming out of it at 8,950 ft. Predicted depth for coming out of the salt was 9,130 ft.

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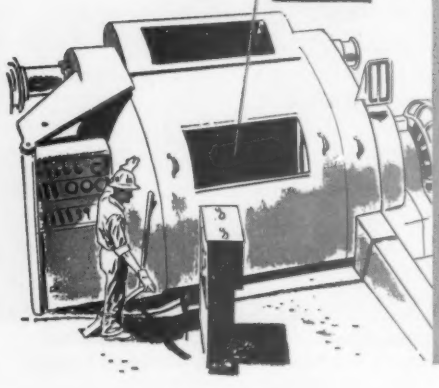

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New field opens in shadow of New Orleans

Another Louisiana Gulf Coast multiple-pay oil and gas-condensate field has been found almost in the shadows of New Orleans' downtown skyscrapers.

Its discovery well, drilled by Anson Petroleum Co. and John Bricker, is just outside Westwego, a suburb located immediately across the Mississippi River from the New Orleans business section.

The well, 1 Celotex, in 12-14s-23e, has more than 160 ft. of net oil or gas sand from 9,026 to 9,214 ft. From a perforated 2-ft. interval at 9,196-98 ft., it flowed at the rate of 360 bbl. of 32°-gravity oil per day during tests through 8/64-in. choke. Flowing pressure was 1,525 psi.

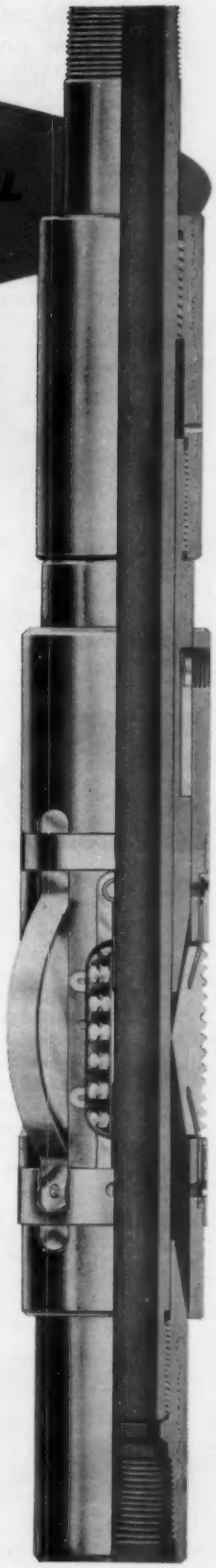
Another 2-ft. interval at 9,138-40 ft. flowed through 14/64-in. choke at the rate of 3,800 M.c.f.d. of gas, carrying 13 to 15 bbl. of condensate per 1 M.M.c.f. Top pressure was 2,925 psi.

Additional pay-intervals will be tested before the well is completed.

Location is about midway between Westwego and Avondale fields, two much-older producing areas lying just across the Mississippi River from New Orleans.

NEW TWO-IN-ONE TOOL

the **HALLIBURTON** *Ta/c*



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Performing its *anchor* function, the Halliburton Tubing Anchor/Catcher is set by simple tubing manipulation, and the tubing pulled into tension. Corrosion resistant parts make this sensibly priced tool ideal for most any well.

Once in the well, the *catcher* feature of the new Tubing Anchor/Catcher reduces costly fishing jobs. After the tubing is placed in tension, if a tubing break should occur above the tool, downward movement of the tubing will reverse the position of the slips from lower to upper wedge to prevent further downward movement. Since the tubing movement before the slips are re-engaged is just a few inches, the resulting fish is normally a straight, easily retrieved string... not a twisted, jagged stack of steel.

Get the full story on this new two-in-one tool from your Halliburton Representative. Ask for the Tubing Anchor/Catcher Brochure.

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Kansas field adds prolific new pay

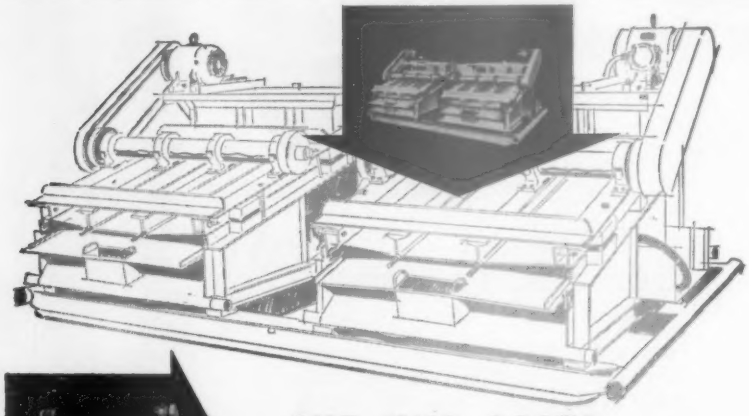
In Kansas, Helmerich & Payne, Inc., released the results of the state potential test taken on a new zone discovery oil well, the A-1 Reimer in Southeast Eubank field, Haskell County.

The well flowed at a rate of 490 bbl. per day through a ¾-in. choke from the Marmaton section between 4,674-92 ft. The well's location is C SW SW 35-28s-34w and is ½ mile southwest of the pool's first well which was a Lansing zone oil discovery.

• The new well is the second in Southeast Eubank field and is 1½ miles east of the Eubank field, a 1958 H&P discovery. The company now has 15 wells in the Eubank area producing from four different pay zones ranging from the Lansing at 4,100 ft. down to the Chester sand at 5,400 ft. Ten miles north of Eubank field, Helmerich & Payne has 57 wells in Pleasant Prairie field, a Mississippian oil reservoir at about 5,100 ft. Both oil fields underlie Hugoton gas field.

The Helmerich & Payne A-1 Reimer was drilled to a total depth of 5,634 ft. in the St. Louis formation of Mississippian age and was plugged back to the Marmaton pay zone. Four and one-half-inch casing was set at 4,745 ft. and perforated from 4,674-80 ft. in the Marmaton with two holes per foot. After acidizing with 500 gal., the well flowed at a rate of 29 bbl. per hour on production test.

Elevation of the A-1 Reimer was 2,992 ft. KB. Electrical-log formation tops were Lansing 4,085 ft., Marmaton 4,603 ft., Morrow 5,152 ft., Ste. Genevieve 5,390 ft., and St. Louis 5,486 ft.



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"RUMBA" Shale Shakers with De-Sanders will cut your drilling mud costs by removing more shale and sand to give you a cleaner mud, while saving you money on your shaker investment.

"RUMBA" handles more mud, more efficiently because the mud is evenly channeled from the spreader box and directed over the *full width* of the screened surface area. To insure maximum removal of cuttings, "RUMBA" Shakers are equipped with five foot lateral frame struts and distribute an equal amount of vibration to every inch of the under-slung, stainless steel screen cloth. The under-slung vibrating screen cloth also removes tons of sand that would otherwise damage pumps, pistons, liners, and valves. The cloth is attached with stainless steel hooks that will not rust or corrode. Hooks last the life of the screen.

"RUMBA'S" new and improved design of mud tank, by-pass and return mud outlet has been enlarged to handle the flow of the largest pumps in the industry. "RUMBA" Shale Shakers are built stronger. Require less maintenance than any other type of shale shaker.

"RUMBA" Shale Shakers and De-Sanders are sold through supply stores everywhere.

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Hugoton embayment scene of significant find

A significant new field appears to have been found in the Hugoton embayment of western Kansas.

Discovery well, Colorado Oil & Gas Corp. 1 Antrim, is 10 miles northeast of Jetmore, in Hodgeman County.

It has been swabbing at the rate of 40 bbl. of 36°-gravity oil per hour while testing Mississippian lime, perforated at 4,370-86 ft.

Top of the Mississippian Lime was logged at 4,364 ft. with oil pay to 4,445 ft. Hole was taken to 4,668 ft.

The well is on a lease spread in the area totaling 1,000 acres. A 40-acre south offset to the discovery already is near the pay.

Northeast Ohio gains new Clinton producer

IN OHIO a successful pool opener is indicated in the search for gas production in Ashtabula County.

Northern Natural Gas Production Co.'s rank wildcat, 1 Frank Harmon, Section 15, Lenox Township, found production in the Clinton sand from 3,430-84 ft. It gaged 60 M.c.f.d. natural and finaled at 297 M.c.f.d. after fracture with a rock pressure of 990 psi.

• Natural production from the Clinton sand of 3,359 M.c.f.d. was reported by Sanders & Thoreen on completion of 1 Emma Church, Lot 19, Union Township, Knox County.

This ½-mile stepout, west of Brinkhaven pool, logged the sand at 2,884-2,891 ft. and 2,896-2,924 ft. Rock pressure was 940 psi. in a 35-hour test.

• Another good gasser has been completed in the new-pool development in northwest Westfield Township, Medina County.

The 1 T. Schroeder, Lot 24, had the Clinton pay from 3,249-68 ft. with a natural gage of 214 M.c.f.d.

June completions in Canada—Western and Ontario

	TOTAL WELLS							WILDCATS					
	Total	Oil	Gas	Dry	Service	Footage	Cum. 1960	Total	Oil	Gas	Dry	Footage	Cum. 1960
Western Canada	197	122	27	47	1	917,174	1,122	45	4	11	30	203,154	317
Alberta	119	61	23	34	1	619,487	748	32	2	9	21	146,066	204
Saskatchewan	61	46	4	11	0	247,281	244	11	1	2	8	49,370	50
Manitoba	12	11	0	1	0	25,770	33	1	0	0	1	3,465	6
British Columbia	5	4	0	1	..	24,636	84	1	1	0	0	4,253	44
N.W.T.	0	0	0	0	0	.....	13	0	0	0	0	.....	13
Ontario	24	3	8	10	3	39,900	127	..	..	..	..	.....	...

WEST CENTRAL TEXAS

Callahan County:

W. D. Compression 1-89-C Edgar Davis (was West Central Drilling Co.), 5 miles east of Hamby in Sec. 89, Blk. 13, T&P Sur. Cook sand 1,771-74 ft. IPCAOF 1,440 M.c.f.d. TD 1,806 ft. New gas discovery.

Taylor County:

Lauderdale and Straughn Drilling Co. et al. 1 James L. Graham, 4 miles west of Ovalo in H. Corzine Sur. 508. IPF 274 BOPD, 16/64-in. choke, 43°, GOR 300:1, TP 110 psi. packer. Cross Cut 4,079-86 ft. TD 4,738 ft. PBTD 4,086 ft. New oil discovery.

Days Operating Co. and W. J. Fulwiler, Jr. 1-60 P. H. Evans, 1 mile west of Capps in Wm. B. Hardin Sur. 120. IPF 158 BOPD, 12/64-in. choke, 43.3°, GOR 780:1, packer, TP 355 psi. Morris sand 4,190-98 ft. TD 4,528 ft. New oil discovery.

Fletcher Oil & Gas Drilling Corp. 1 Emma Hankins, 10 miles southwest of Abilene, Goliad CSL Sur. 143. IPF 150 BOPD, plus 6% water, 18/64-in. choke, 42°, GOR 1100:1. TP 320 psi., packer. Jennings sand 4,989-95 ft. TD 5,530 ft. New oil discovery.

TEXAS PANHANDLE

Ochiltree County:

Ridgmorr Oil Co. 1-37 Banner-Gragg, Sec. 37, Blk. 4, GH&H Sur. 2 miles north of Farnsworth and 2 miles east of Share upper Morrow and Twin Des Moines field. IPCAOF 5,400 M.c.f.d., SIP 2,705 psi. lower Morrow 8,231-39 ft. TD 8,475 ft. New gas discovery.

SOUTHWEST TEXAS

Hidalgo County:

Tex-Star Oil & Gas Corp. 1 R. J. McBean et al., Section 58, Farm Tract 2345, North Capisallo District Subd. of Llano Grande Grant, 2 miles southwest of La Villa. AOF 4,800 M.c.f.d., GLR 16.5 M.c.f. per bbl., 57°, shut-in pressure 2,010 psi., perf. 6,682-6,714 ft., Frio. TD 8,122 ft. New pay in Mercedes area.

WEST TEXAS

Crane County:

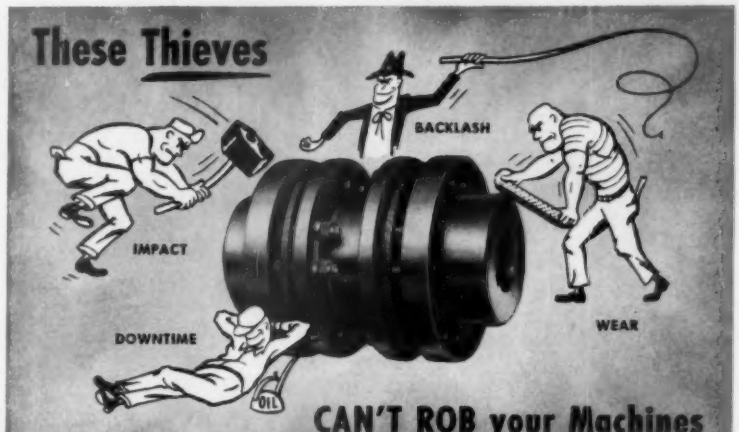
Sunray et al. 1-19 University, Sec. 46, Blk. 31, Univ. Lands Sur. IPP 109 BOPD, 33.4°, Grayburg 2,985-97 ft. TD 5,010 ft. New oil discovery.

Ector County:

Texaco Inc. 61 W. E. Connell NCT-1, OWPB, Sec. 13, Blk. B-16, PSL Sur. IPP 70 BOPD, 37.1°, GOR 695:1. Wolfcamp 6,678-6,734 ft. TD 7,450 ft. PBTD 6,790 ft. New oil discovery.

McCulloch County:

New Seven Falls Co. 1 Edith Moore Mitchell, 6 miles east of Lohn in C. S.



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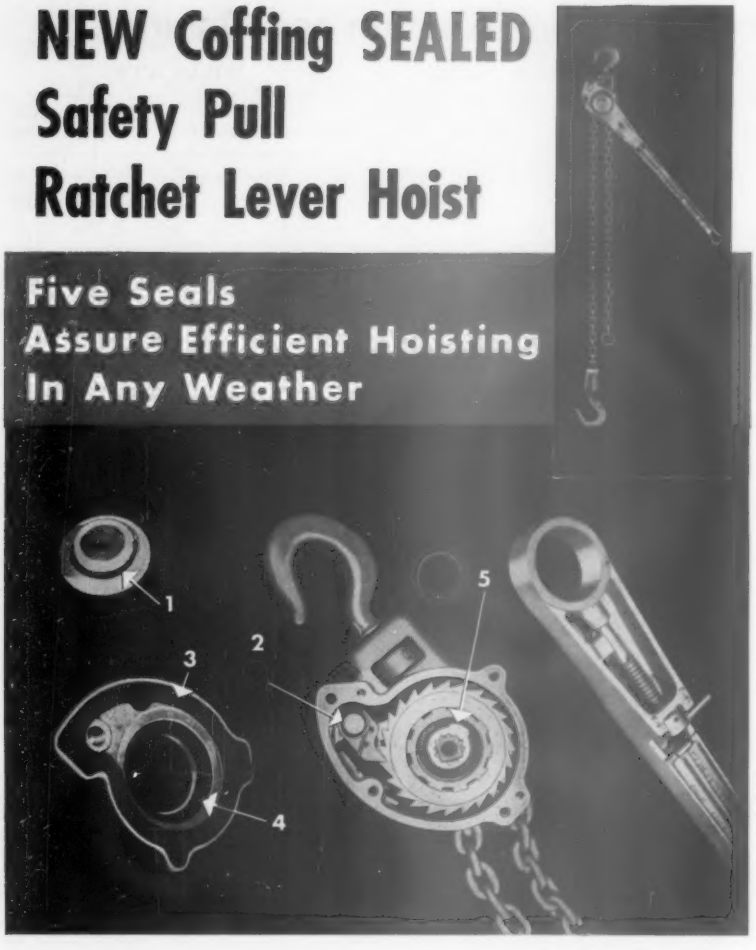

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Ratchet • Screw
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Durham Sur. 38, A-2319. IPF 247 M.c.f.d., Strawn 694-702 ft. TD 1,038 ft. New gas discovery.

Pecos County:

American Trading & Production Co. 1 Dorothy Vaughn, 10 miles south of Imperial in Sec. 32, Blk. 10, H&GN Sur. IPF 353 BOPD, 16/64-in. choke, 34°, GOR 1,710:1. TP 1,150 psi. CP 1,700 psi. Devonian 5,402-38 and 5,442-50 ft. TD 6,037 ft. New oil discovery.

Runnels County:

Bridwell Oil Co. 1 Bill Harmon, Henry L. Bays Sur. 444, 124 BOPD, 12/64-in. choke, 40°, GOR 420:1. TP 440 psi. CP packer. Fry sand 4,460-65 ft. TD 4,663 ft. PBTD 4,631 ft. New oil discovery.

Scurry County:

Drilling & Exploration Co. Inc. 1-A Jones Brothers, 1½ miles southeast of Fluvanna in Sec. 360, Blk. 97, H&TC Sur. IPP 165 BOPD, 40.4°, GOR 1,158:1. Pennsylvanian 7,806-16 ft. TD 8,291 ft. New oil discovery.

BOOK REVIEW

THE NATURAL GAS INDUSTRY. Monopoly and Competition in Field Markets. By Edward J. Neuner. An Oil and Gas Journal Book. Published by University of Oklahoma Press, Norman. 302 pages. $5.75.

Federal regulation of field prices of natural gas is not justified on the grounds that production is a monopoly or is so closely controlled that producers can, by concerted action or otherwise, exercise monopolistic price fixing to the detriment of consumers.

There may be other reasons for regulating producers, the author says, but there is no factual support for the allegation that gas production is so monopolistic that regulation as a utility is justified.

The conclusion is based on an exhaustive and detailed analysis of pipeline contracts and other published data including Federal Power Commission reports and congressional hearings on gas legislation.

In each of the principal gas-producing areas of the U. S. a study is made of the history of price movements, what happened with the advent of new pipeline purchasers, the development of new types of escalation clauses and other contract provisions, the concentration of ownership of reserves and sales volume of large and small producers, and similar conditions.

The author's conclusion is that in every area the increase in prices and the use of escalation clauses which later received severe criticims were brought about primarily by competition among pipeline buyers and not by any combination or coercion of gas sellers.

For those in the oil and gas industry the book contains some useful historical and statistical data on gas prices and contract terms. For economists the book contains considerable theoretical discussion and technical analysis of market behavior in gas field prices.

In a brief concluding chapter the author outlines a policy proposal. He says the underlying economic fault of the gas industry, the condition which caused prices to rise rapidly and which prevents gas prices from being flexibly responsive to market conditions, is the practice of long-term commitments of reserves.

Effective regulation must be directed toward replacing these dedications with something like an organized spot market for gas, possibly under some form of public supervision, the author concludes.

The author is a professor of economics at San Diego University. The study was aided by a grant from the Ford Foundation.

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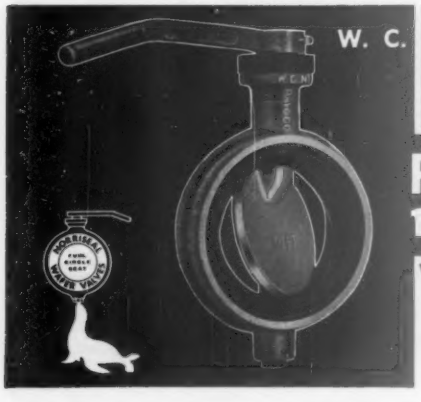
June footage breakdown . . . in the U. S.

	FIELD WELLS					WILDCAT WELLS			
	Oil	Cond.	Gas	Dry	Service	Oil	Cond.	Gas	Dry
Alabama	57,553								
Alaska	11,119		12,029						26,714
Arizona									10,434
Arkansas	58,515		6,514	74,725		19,318		5,000	35,652
California	528,837		42,311	68,686		5,500		13,153	82,071
Colorado	49,424		35,527	39,958		4,775		6,803	115,267
Illinois	163,095			157,288	40,387	677			63,504
Indiana	51,476		802	47,864		8,485		2,514	30,698
Iowa									1,500
Kansas	524,837		25,945	265,220	19,794	46,974			333,864
Kentucky	55,909		15,103	85,346	1,705	2,510		5,705	15,299
Louisiana	1,109,397	363,633	101,606	644,184		24,314	28,662	11,089	498,813
North	153,871		80,934	185,550		10,466		11,089	179,790
South	694,618	311,722	20,672	367,821		13,848	28,662		259,579
Offshore	260,908	51,911		90,813					59,444
Michigan	93,488		2,243	61,831	5,242	6,307			57,615
Mississippi	160,838	23,426	15,988	107,695		35,088			311,896
Missouri						600			17,668
Montana	100,874			32,177					93,035
Nebraska	106,289			108,365		11,111			164,789
New Mexico	457,909	40,589	143,901	116,107	3,324	14,524		5,250	129,048
West	53,681	26,194	143,901	7,866		3,438			20,075
East	404,228	14,395		108,241	3,324	11,086		5,250	108,973
New York	17,550		4,611	4,788	10,000			16,813	29,728
North Dakota	74,243			29,009					49,341
Ohio	87,927		28,776	21,934					7,133
Oklahoma	714,766	47,532	185,541	287,379	19,042	93,529	8,978	10,381	299,722
Oregon									8,179
Pennsylvania	35,291		81,172	45,678	31,400			7,586	
Tennessee	809					988			14,257
Texas	3,138,650	534,181	191,729	1,177,572	81,299	51,105	38,031	52,325	1,188,352
Dist. 1	66,608	8,000	13,501	24,143		5,519			161,272
Dist. 2	101,795	95,410	31,916	124,188			12,198		96,028
Dist. 3	245,000	85,761	19,079	249,026				3,500	183,223
Dist. 4	89,994	76,431	11,144	71,251			18,180	21,060	112,210
East	286,850	100,281		117,813	8,435				149,352
Dist. 7-B	270,891	4,138	8,981	114,044	13,697	17,224	4,393	13,459	169,347
West	1,541,240	87,900	21,778	271,630	24,889	8,600	3,260	695	164,462
Dist. 9	319,651	29,172	7,519	144,884	31,647	19,762			101,411
Dist. 10	216,621	47,088	77,811	60,593	2,631			13,611	51,047
Utah	52,024		14,009			9,533		5,672	5,705
West Virginia	8,303		77,629	23,637	3,900				
Wyoming	238,858		17,904	78,901		20,537			241,510
Total June	**7,897,981**	**1,009,361**	**1,003,340**	**3,478,344**	**216,093**	**355,875**	**75,671**	**142,291**	**3,831,794**

. . . and in Western Canada

Western Canada	567,399		65,279	77,038	4,304	14,482		34,387	154,285
Alberta	350,358		60,590	58,169	4,304	8,411		29,979	107,676
Saskatchewan	181,853		4,689	11,369		1,818		4,408	43,144
Manitoba	22,305								3,465
British Columbia	12,883			7,500		4,253			
Northwest Territories									



June's well score in the U. S.

State—	Total completions									Cable-tool comp.	D.D.	Wildcats							
	Total	Oil	Cond.	Gas	Dry	Service	Footage	Cum. wells 1960	Cum. footage 1960			Total	Oil	Cond.	Gas	Dry	Footage	Cum. wells 1960	Cum. footage 1960
Alabama	5	5	0	0	0	0	57,553	27	286,592	0	0	0	0	0	0	0	0	1	2,646
Alaska	4	1	0	1	2	0	49,862	7	84,565	0	0	2	0	0	0	2	26,714	1	38,029
Arizona	2	0	0	0	2	0	10,434	8	20,032	0	0	2	0	0	0	2	10,434	8	20,032
Arkansas	57	22	0	2	33	0	199,724	302	1,113,820	0	0	19	6	0	1	12	59,970	79	308,760
California	147	112	0	11	24	0	740,558	690	3,382,262	2	0	16	1	0	2	13	100,724	137	762,477
Colorado	49	11	0	7	31	0	251,754	313	1,547,564	0	0	25	1	0	1	23	126,845	151	761,422
Florida	0	0	0	0	0	0	0	3	33,807	0	0	0	0	0	0	0	0	3	33,807
Illinois	212	75	0	0	112	25	424,951	992	1,993,084	*34	16	33	1	0	0	32	64,181	225	401,794
Indiana	104	39	0	2	63	0	141,839	469	639,175	*41	4	32	6	0	1	25	41,697	178	224,189
Iowa	1	0	0	0	1	0	1,500	2	2,007	0	0	1	0	0	0	1	1,500	2	2,007
Kansas	342	167	0	6	162	7	1,216,634	1,650	5,847,327	0	0	102	14	0	0	88	380,838	539	1,992,708
Kentucky	129	45	0	7	76	1	181,577	783	1,094,578	*81	2	14	1	0	1	12	23,514	91	137,156
Louisiana	367	154	32	24	157	0	2,781,698	1,720	14,079,902	0	0	72	4	2	1	65	562,878	270	2,389,246
North	159	55	0	21	83	0	621,700	595	2,342,957	0	0	42	3	0	1	38	201,345	125	646,970
South	163	73	27	3	60	0	1,696,922	857	8,871,458	0	0	25	1	2	0	22	302,089	127	1,510,937
Offshore	45	26	5	0	14	0	463,076	268	2,865,487	0	0	5	0	0	0	5	59,444	18	231,339
Michigan	66	29	0	1	32	4	226,726	361	1,225,000	32	1	17	2	0	0	15	63,922	103	377,127
Mississippi	63	19	2	1	41	0	654,931	362	3,660,278	0	1	34	3	0	0	31	346,984	129	1,276,216
Missouri	19	2	0	0	17	0	18,268	22	28,372	16	0	19	2	0	0	17	18,268	22	28,372
Montana	44	15	0	0	29	0	226,086	147	703,600	2	0	22	0	0	0	22	93,035	69	286,909
Nebraska	72	22	0	0	50	0	396,554	399	2,261,954	0	0	34	2	0	0	32	175,900	158	850,030
Nevada	0	0	0	0	0	0	0	2	7,902	0	0	0	0	0	0	0	0	2	7,902
New Mexico	198	97	6	34	60	1	910,652	931	4,418,664	43	3	35	3	0	1	31	148,822	142	695,024
West	61	16	4	33	8	0	255,155	300	1,314,349	10	2	7	1	0	0	6	23,513	29	117,773
East	137	81	2	1	52	1	655,497	631	3,104,315	33	1	28	2	0	1	25	125,309	113	577,251
New York	39	13	0	6	13	7	83,490	158	258,854	39	0	14	0	0	4	10	46,541	21	68,187
North Dakota	24	11	0	0	13	0	152,593	151	974,290	0	0	9	0	0	0	9	49,341	35	178,453
Ohio	65	35	0	13	17	0	145,770	493	1,205,917	60	0	3	0	0	0	3	7,133	27	90,068
Oklahoma	392	197	7	36	140	12	1,666,870	1,970	8,604,629	39	13	83	16	1	2	64	412,610	386	1,975,327
Oregon	2	0	0	0	2	0	8,179	3	10,806	2	0	2	0	0	0	2	8,179	3	10,806
Pennsylvania	65	19	0	22	7	17	201,127	311	939,247	61	0	1	0	0	1	0	7,586	7	49,181
South Dakota	0	0	0	0	0	0	0	15	101,951	0	0	0	0	0	0	0	0	6	24,848
Tennessee	20	5	0	0	15	0	16,054	40	32,576	20	0	18	3	0	0	15	15,245	38	31,767
Texas	1,518	798	67	62	561	30	6,453,244	8,027	34,521,672	64	20	297	10	6	9	272	1,329,813	1,614	7,413,802
District 1	98	35	1	2	60	0	279,043	551	1,566,511	3	1	52	1	0	0	51	166,791	207	637,572
District 2	69	14	13	8	34	0	461,535	377	2,511,323	0	1	16	0	1	0	15	108,226	89	618,072
District 3	118	50	8	5	55	0	785,589	620	4,324,666	0	0	23	0	0	1	22	186,723	117	1,018,539
District 4	76	20	10	7	39	0	400,270	548	3,033,622	0	2	27	0	2	3	22	151,450	162	900,940
East	147	75	12	0	57	3	662,731	637	2,949,850	0	0	28	0	0	0	28	149,352	133	746,617
District 7-B	207	96	2	5	101	3	616,174	1,155	3,268,783	0	0	62	4	1	3	54	204,423	328	983,181
West	427	303	10	4	100	10	2,124,454	2,144	10,768,684	22	5	47	1	2	1	43	177,017	332	1,452,501
District 9	268	156	5	2	93	12	654,046	1,484	3,733,311	39	9	34	4	0	0	30	121,173	210	763,825
District 10	108	49	6	29	22	2	469,402	511	2,364,922	0	2	8	0	0	1	7	64,658	36	292,555
Utah	15	10	0	4	1	0	86,943	132	738,938	0	0	3	1	0	1	1	20,910	45	256,725
Washington	0	0	0	0	0	0	0	1	8,520	0	0	0	0	0	0	0	0	1	8,520
West Virginia	44	4	0	30	8	2	113,469	356	897,517	40	0	0	0	0	0	0	0	4	27,058
Wyoming	115	54	0	3	58	0	597,710	509	2,552,694	2	1	44	3	0	0	41	262,047	210	1,114,721
Total June	**4,180**	**1,961**	**114**	**272**	**1,727**	**106**	**18,010,750**	**21,356**	**93,278,096**	***578**	**61**	**952**	**79**	**9**	**25**	**839**	**4,405,631**	**4,708**	**21,845,316**
Total May	3,342	1,638	95	242	1,283	84	14,495,113	.....	.....	501	48	727	72	9	32	614	3,461,168	.....	.....
Cumulative 1960	**21,356**	**10,043**	**658**	**1,657**	**8,386**	**612**	**93,278,096**	.....	.....	**3,504**	**279**	**4,708**	**417**	**50**	**151**	**4,090**	**21,845,316**	.....	.....
Cumulative 1959	24,367	12,399	602	1,773	8,972	621	100,588,709	.....	.....	....	....	4,517	450	63	135	3,869	22,280,004	.....	.....

*Estimated.

Ralph L. Cormany . . . new head of Landmen's association.

Tougher Leasing Urged

• Signal's Ralph Cormany says wells aren't being drilled in some spots due to high land costs. It's the landman's job to help trim these rising costs.

LANDMEN need to "trade tougher" in order to help put the brakes on spiraling exploration costs.

This advice comes from Ralph L. Cormany, Los Angeles, newly elected president of the American Association of Petroleum Landmen. Cormany is administrative assistant to Signal Oil & Gas Co.'s director of exploration.

"Exploration is being priced out of the oil business in some places due to the high cost of land," Cormany said. "The profit-per-dollar-risk is just too great."

The AAPL president cites California as a prime example of an area where land costs have grown out of proportion. In some of the hot drilling areas in California, rentals have soared to between $5 and $10 a month payable a year in advance when a "reasonable" rental would be $10 a year, Cormany says. Royalty rates have been increasing at the same time, with a royalty of between 20 to 25% common in some areas.

Cormany says in areas where rentals and royalties have been held in line, over rides and other premiums have been adopted. These all add to increased costs.

He is quick to recognize that the men of his profession must help cut these costs by being harder to live with when it comes to signing a lease.

Background . . . Ralph Cormany has all the talents to become a tough trader both physically and otherwise.

He's an ex-Marine major who turned down a professional football career to study law while coaching at Rockhurst College, Kansas City. Cormany, whose 225 lb. are spread out over a 6-foot-plus frame, played tackle at Loras College, Dubuque, Iowa, during his college days.

When discharged from the Marines in 1946, Cormany wanted to study law. He figured it would take 10 years to get his law degree by going to school during the off season as a professional football player. So he took the coaching job at Rockhurst and studied law a few blocks away at Kansas City University. He received his law degree in 4 years.

Cormany got into the oil business because he thought it offered opportunities. He was recalled by the Marines during the Korean conflict and served 2 years before his discharge in 1952. He decided to look around California for a job.

His legal background enabled him to sign up with Standard Oil Co. of California as a contract supervisor.

▶▶▶ Personals

R. E. Bollinger, production foreman for Mobil Oil Co., has been transferred to Waynesboro, Miss., from Laurel.

D. T. Gilman has been appointed operations manager for Shell Oil Co.'s Indianapolis division. Gilman succeeds **J. C. Kelbaugh,** who has been named administrative assistant to the manager of Shell's Houston refinery.

J. R. Samples, superintendent of the southwest division of Sohio Petroleum Co., has been transferred to Shreveport as part of the relocation of the southwestern division headquarters.

A. J. Longley, engineer with Shell Development Co., has been transferred to Houston from New Orleans.

L. Phil Gagnon has been appointed general manager for Quebec of Golden Eagle Refining Co. of Canada, Ltd. **James Allen** has been appointed general manager of Golden Eagle for Newfoundland.

H. J. Gruy of H. J. Gruy and Associates, Inc., has formed a new company, Petroleum Property Management, Inc. The new company will supervise oil and gas production and development operations for others on a contract basis.

Dr. Alfred E. Hirschler has been appointed research associate in Sun Oil Co.'s research and development division. **Dr. Richard S. Stearns** has been appointed chief of the polymers, lubes and wax section.

L. L. Buck has resigned as chief mechanical engineer in Sunray Mid-Continent Oil Co.'s production department, Tulsa, to join L. & B. Engineering & Construction, Inc., as vice president for engineering and sales. He will headquarter in Tulsa. L. & B. specializes in engineering and construction of natural-gasoline plants and other oil field facilities. Buck had been with Sunray since 1955.

He left California Standard in 1956 to become manager of lands for Hancock Oil Co., which merged with Signal in 1958.

The land department of Signal has had a workout since Cormany joined the company. In addition to leasing in Venezuela, the company is one of the bigger town-lot leaseholders in Los Angeles. And town-lot leasing requires a lot of land department work.

Signal has one West Los Angeles town-lot lease which involves approximately 30,000 landowners. This is more landowners than many companies will come in contact with in years of leasing.

AAPL work . . . Cormany has a busy year outlined as head of the landmen's association.

The association has two goals for 1960: To push its education and scholarship program, and to clarify membership qualifications.

Land management courses are offered at Oklahoma University and Texas University and AAPL hopes to convince other colleges of the need for such training. Cormany says the association is aiming at getting similar courses offered on the Gulf Coast, in the Rockies, and the West Coast.

As far as membership qualifications are concerned, the association wants to broaden its rules so that men who once were landmen but have moved up to higher positions in companies can retain their membership. Cormany said two past presidents actually aren't qualified to hold AAPL memberships because they have moved up to executive positions in recent years.

And it is a safe bet Cormany will also be selling his fellow AAPL members his philosophy that landmen have the important job of keeping costs down by altering the trend of rising rentals, royalties, and other lease provisions.

J. P. Secord has been appointed western division manager of Shell Oil Co. of Canada, Ltd.

G. W. Blackburn, district production superintendent with Pure Oil Co., has been transferred to Victoria, Tex., from Madisonville, Tex.

Lloyd R. Williamson and **H. L. Wilson,** Wichita independents, and **John D. Carey,** exploration and land manager for Natural Gas & Oil Corp., have been elected directors of the Kansas Independent Oil and Gas Association. **H. A. Palmer,** Medicine Lodge, was elected vice president for West-Central Kansas.

Vernon E. Eck has been named associate engineer for Continental Oil Co. in Wewoka, Okla. He had been on an engineering training program with the company.

Wilbur R. Lilly and **Harold R. Mayer,** formerly engineers with Gulf Oil Corp. in Jackson, Miss., have formed Lilly & Mayer, consulting engineering firm, in Jackson.

BLOCH

Dr. Herman S. Bloch has been named as associate director in process research for Universal Oil Products Co. Named as research coordinators in process research were **James Hoekstra** and **Dr. Ernest L. Pollitzer. Dr. William L. Cox** has been appointed research coordinator in product research.

Jack N. West has been named manager of the Toledo refinery of Pure Oil Co. He replaces **Hal H. Dronberger,** who has retired and is now associated with a Chicago firm as consultant.

Harold S. McClintock, Jr. has been named president of Mercury-Chipman Co., Ltd., a new exploration company in Toronto. McClintock has been head of exploration for Russell Cobb, Jr., Inc.

F. B. Winbery, manager of the Dallas pipeline district of United Gas Pipe Line Co., has been named manager of a new consolidated district at Tyler, Tex. **Boyd K. Watson, Jr.,** land man in the Tyler producing district, has been named Winbery's assistant.

Dr. Lewis F. Hatch, Texas University professor and petrochemistry consultant, has received a Fulbright grant and will lecture at the University of Cairo, 1960-61. He will also serve as a consultant in petrochemistry to the United Arab Republic's National Research Center.

William H. Fetter, has been elected president of Texas City Refining, Inc., replacing **V. A. Fogg,** who is moving up to chairman. Fetter has been vice president and general manager since 1951. Others elected or re-elected by the company are **W. T. Steele,** vice president and vice chairman; **L. W. Robbie,** vice president - operations; **I. W. Fariss,** vice president-sales; **E. A. Richardson,** treasurer; **J. R. Ayres, Jr.,** secretary; and **L. B. Wilson,** assistant secretary and treasurer.

▶▶▶ Personals

R. O. Jackson, chief engineer for Sohio Pipe Line Co., has been transferred to Cleveland from St. Louis.

Philip G. McCarney, supervisor with Texas Eastern Transmission Corp., has been transferred to Harrisburg, Pa., from West Chester, Pa.

Fred R. Tiddens has joined Dakota International Petroleum, Inc., as exploration manager. Tiddens was formerly land manager for North American Royalities, Inc.

Dan A. Langford, engineer in the Pratt, Kans., production and exploration department of Lion Oil Co., has been transferred to Houston. **Conrad Cummings,** on Lion's Houston engineering staff, has been transferred to Pratt.

Dr. Edgar L. Steele has accepted an assignment in the new analytical chemical division of Esso Research & Engineering Co., Linden, N. J. Before beginning the new job, Steele will take a year of postgraduate work at Michigan State College studying the application of radioactive materials to petroleum research.

Keith Doig has been named chief mechanical engineer, Houston production department, by Shell Oil Co. He succeeds **John M. Payne,** who has been transferred to the Denver area. Since 1959, Doig has been senior mechanical engineer for Shell Development Co.'s exploration and production division in Houston. In 1956 he held the same post in New Orleans, and in 1958, became division gas superintendent at Lafayette, La. Doig joined Shell in 1946.

DOIG

Six department managers have been appointed in three divisions of the Mobil Chemical Co., an operating division of Socony Mobil Oil Co., Inc. The new managers in the development division are **Warren A. Beman,** new projects-domestic; **Arnaud de Vitry,** new projects-international; **Alfred G. Rossow,** market research; and **William D. Warmack,** economic appraisal. **Thomas L. Apjohn** is manager of additives in the paint and special projects division, and **George H. Hocking** is sales manager of the basic petroleum chemicals division.

Personals

J. A. Smith, superintendent of gas and gasoline plants in the Los Angeles division of Texaco Inc., has been elected president for 1960-61 of the California Natural Gasoline Association. Smith succeeds **K. C. Vaughan,** Union Oil Co. of California. Newly elected to the CNGA board of directors were **E. H. Fisher,** Pacific Gas & Electric Co.; **John R. Fraser,** Union; **Warren F. Kane,** Clark Bros. Co.; **J. A. Millen,** Southern Counties Gas Co.; **L. S. Osborne,** Union Pacific Railroad Co.; and **L. L. Palmer,** Chanslor-Western Oil & Development Co. **E. R. Millett,** was reappointed secretary-treasurer of the association and **R. O. Boykin,** manager of gasoline plants and assistant to the vice president, production, Monterey Oil Co., was elected vice president.

SMITH

Jack Webster, operator of Webster Oil & Gas Co. in Springfield, Mo., has been elected president of the Missouri State Board of Education. He is in the third year of an 8-year term.

Dr. Philip S. Nisson has been named manager of the technical department of Pure Oil Co.'s refining division. Nisson succeeds **Adolph Spiehler,** who is now doing advisory work with the company. Nisson has been with Pure since 1933.

Robert B. Sykes and **Leslie T. Larson** have been named project managers in engineering of the manufacturing department of Amoco Chemical Corp. Previously, Larson was in the heavy-oils division of the Whiting refinery of Standard Oil Co. (Ind.) and Sykes was chief engineer at the Destrehan refinery of American Oil Co.

E. E. Powell, of Esso Research & Engineering Co., Pittsburgh; **Lysle R. Kirk,** of Ohio Fuel Gas Co., Columbus, Ohio; and **Millard H. Flood,** of Ohio Oil Co., Terre Haute, Ind., will receive "certificates for service" in Pittsburgh July 27, at the eastern district meeting of the American Petroleum Institute's Division of Production. Also honored with meritorious service awards will be **Bill Harmon,** of B. G. Harmon Service Co., Carmi, Ill., and **Verco F. Sargent,** of the Michigan Department of Conservation, Mount Pleasant, Mich.

N. A. Bassett, geologist for Schermerhorn Oil Corp., has been transferred from Tulsa to Casper, Wyo., where the company has opened new offices.

Jerry D. Doane has resigned as research chemist with Cities Service Research & Development Co. in Tulsa to join Skelly Oil Co.'s Tulsa office as reservoir engineer.

Dr. Robert J. Belner has been named technical manager of new products and **William J. Hanlon** has been appointed technical manager of standard products for General Tire & Rubber Co.'s chemical division, Akron.

Jack Hooton, assistant to the head of the engineering and procurement department at the Bayway refinery of Humble Oil & Refining Co.'s Esso Standard division, Linden, N. J., has been given a 2-year loan assignment in Rotterdam. Hooton has been with Standard Oil Co. (N. J.) and its affiliates since 1921.

George T. Hansen, Jr., president of Hyland Oil Corp., a Salt Lake independent oil company, has been elected the 1960-61 president of Salt Lake Petroleum Club. Other club officers are **Allen N. Henderson,** first vice president; **W. O. Darley,** second vice president; **A. D. Ekols,** secretary; and **A. P. Lorfing,** treasurer. New directors are **Jack DuBell, J. W. Sullivan, O. L. McNew, James Whitaker** and **D. H. Turner.**

T. H. Rhodes has been named head of marketing and technical services coordination for Enjay Chemical Co., a division of Humble Oil and Refining Co. **R. T. Kelly** will head marketing manufacturing coordination, and **T. C. Drakos** and **D. H. McClure** will be marketing coordinator and manufacturing coordinator for the company.

Dr. William L. Baker has joined California Research Corp.'s La Habra, Calif., laboratory as research geophysicist. **William V. Stiles, Dr. Carl A. Rambow, Joe E. Thomas,** and **Marilyn B. Sweeney** have joined the La Habra laboratory as research engineers. **Stephen Polotnik** is new research engineer at the El Segundo, Calif., laboratory. New research engineers at the Richmond, Calif., lab are **Frank A. White, Byron G. Spars, Walter L. Smithson, Norman D. Allworth, John L. Spivak,** and **Michael J. Humenick. Harry E. Pickett** has been named research mathematician at Richmond.

Wallace C. Ginder has been named vice president of Petrolane Gas Service in Los Angeles. He served as controller since 1955.

Clarence R. Flynn has been named general foreman-technical of the general chemicals plant of B. F. Goodrich Chemical Co., in Henry, Ill.

F. W. Sommer has been promoted to area engineer for Texaco Inc. at Olney, Tex. He was formerly a field engineer.

Eugene Holland, Jr., vice president of the Continental Illinois National Bank & Trust Co., Chicago, has been placed in charge of the bank's oil and public utilities loan division.

Earle B. Knott has been promoted to exploration superintendent at Corpus Christi, Tex., for Tennessee Gas & Oil Co., a subsidiary of Tennessee Gas Transmission Co. Knott was formerly district geologist at Shreveport, La.

Jack L. Elbel and **D. G. Gurley** have joined the technical services and development department of Dow Chemical Co.'s Dowell division in Tulsa. **J. F. Clifton** has been assigned to the company's Tulsa sales staff succeeding **D. J. Mack,** who has been transferred.

Lee P. Morris has been appointed assistant manager of the Hawaiian refinery by Standard Oil Co. of California, Western Operations, Inc. Morris for the last 4 years has been refinery manager for California Standard's subsidiary, American Gilsonite Co., at Grand Junction, Colo. He has been with California Standard since 1934.

Noble F. Gulledge has been promoted to assistant division production superintendent, Midland division, for Sinclair Oil & Gas Co. Formerly he was district production superintendent at Lafayette, La.

Robert Bredeson, James H. O'Neal, Robert O. Robertson and **John D. Tackett** have been appointed project engineers in the manufacturing department of Amoco Chemicals Corp. Bredeson and O'Neal were formerly in the general engineering department of Standard Oil Co. (Ind.). Tackett was with Service Pipeline Co., Tulsa, and Robertson is presently on extended assignment in Belgium.

J. C. Ducommun, general manager of manufacturing for Standard Oil Co. (Ind.), has been named vice president of manufacturing for American Oil Co. The appointment is part of Indiana Standard's move to place operating activities under one subsidiary (OGJ, July 18, p. 75). In other Amoco appointments, **William H. Miller,** general manager of sales for Indiana Standard, has been named Amoco vice president, marketing. **John E. Kasch,** American Oil vice president, will be general manager of supply and transportation. **Herman L. Boyle,** manager of Indiana Standard's organization department, will be general manager of administration. **Richard J. Farrell,** associate general counsel for the parent company, will be general counsel of Amoco. **Winston S. Peeler,** Amoco vice president of manufacturing, has been named general manager of employe and public relations. **Philip C. White,** general manager of research and development for Indiana Standard, will be general manager of research and development for Amoco. Amoco manufacturing, marketing, and supply and transportation departments will be supervised by **F. Cushing Smith,** executive vice president. **L. W. Moore,** president, will supervise administration, law, employe and public relations, and research and development departments.

DUCOMMUN

MILLER

KASCH

Jack L. Mahaffey has been transferred by Shell Oil Co., to Abilene, Tex. The exploitation engineer was previously at Wichita Falls, Tex.

Robert H. Slocum, district manager, Mobil Oil Co., Burlington, Vt., has been named chairman of the Vermont Petroleum Association. He succeeds **Wilson M. Vanderventer,** a Shell Oil Co., district manager. **Charles P. Meikle,** Vermont district manager for Sun Oil Co., was elected vice chairman and **Paul H. Guare** was re-elected executive secretary.

H. R. Smith, general superintendent of Cities Service Refining Corp., has been elected a vice president. He has been with the company since 1923.

Dr. L. R. Hellwig has been named to direct a new petrochemical division of Cities Service Research & Development Co. Hellwig was formerly head of engineering research for Petroleum Chemicals, Inc.

Ray C. Adams has been appointed manager of a new department of Socony Mobil Oil Co. resulting from a merger of the economics and the planning and analysis departments. In the new department, **James Q. Riordan** is manager of planning and analysis and **Ralph R. Dickson, Jr.** is manager of economics including special studies.

O. G. Simpson has been transferred to New Orleans as assistant division manager of Sinclair Oil & Gas Co.'s exploration and production operations in the southeastern states and offshore in the gulf. Formerly, Simpson was assistant manager of Sinclair's Midland, Tex., division. Previous to that, he was production superintendent at Midland.

C. C. Wallace has been named assistant general superintendent of Sun Pipe Line Co.'s crude-lines department, Beaumont, a new position. Succeeding Wallace as Gulf Coast area superintendent of crude lines is **Jesse D. Duplissey,** formerly superintendent of transportation and oil handling for Venezuelan Sun Oil Co., at Maracaibo, Venezuela. **James E. Ware** has been appointed assistant Gulf Coast area superintendent.

▶▶▶ Personals

BATTSON

E. F. Battson has been elected president of Refineria Panama, S.A., jointly owned by Continental Oil Co. and National Bulk Carriers, Inc. **H. P. Solem** was elected executive vice president and **D. R. Johnson** and **W. W. Wagner** were elected vice presidents. The new company is building a $30,000,000 refinery in Panama. Battson, a former director and vice president of Continental, retired in 1958 but has been serving as a Continental consultant.

Bert B. Davidson has been transferred to Worland, Wyo., as an engineer trainee with Pan American Petroleum Corp.

Gerald H. Thurston has a new position as planning coordinator with air reduction department of Amoco Chemical Corp., at Murray Hill, N. J. He was formerly the manager of commercial development in Chicago.

Joseph F. Bayhi has been appointed assistant chief of geophysical research on a 1-year assignment with Humble Oil & Refining Co. in Houston. He formerly was acting manager of Jersey Production Research Co.'s geophysical division. **Jesse D. Skelton** replaces Bayhi at Jersey Production after returning from a 1-year loan assignment with Humble.

▶▶▶ Deaths

Roy Milton Smith, 78, died July 8 in a Santa Barbara rest home. Smith retired in 1936 after 30 years with Santa Fe Oil Co.

Raymond P. Nevins, 50, died July 11 in Santa Monica, Calif. He was an engineering technician with Standard Oil Co. of California.

Walter W. Miracle, 52, died July 10 at his home in Denver. A drilling contractor and oil producer, he had been with Miracle-Fifer Drilling Co. for the past 15 years.

Samuel O. Edwards, 64, died July 17 in his home at Idabel, Okla. He was a foreman for Gulf Oil Corp., Crane, Tex., before his retirement.

J. R. Roberts, 57, died July 17. Roberts was division manager of Lee C. Moore Co. in Houston and had been with the company for 34 years.

Robert G. Burns, 79, died July 16 in a Tulsa hospital after a brief illness. Burns formerly owned Burns Oil & Gas Co. in Tulsa.

Frank Leland Cooper, 57, died suddenly of a heart attack July 18. Cooper, a retired Tulsa independent oil operator, retired 5 years ago because of ill health.

W. P. Cloyd, retired special auditor, died July 13 at his home in Houston. Cloyd retired in 1954 after serving over 30 years with Texas Co. of Houston and New York City.

Operators have cut drilling programs

BY JOHN C. CASPER

REPORTS of drilling plans at midyear indicate that operators have shifted programs since the first of the year. Data from company questionnaires also show that the Journal's original forecast in January was a valid projection.

By the end of the first quarter of this year it was evident that drillers would not complete as many wells in this country as was forecast in the Journal's Review and Forecast issue. Operators had completed only 21.26% of total wells forecast for the year. In recent years the range of first-quarter completions has been from 23.11% of the year's total in 1955 to 24.66% in 1957.

Interviews with operators and drilling contractors early in the second quarter supplied enough information to show changes in drilling plans for the year. Some operators had cut their over-all programs for the year, but we had no good measure of how many or how much.

Midyear questionnaires gave definite proof that many companies had cut drilling budgets for the year. A few operators had boosted their programs but these were more than offset by important reductions.

In all of the Journal's forecasts of drilling, returned questionnaires are separated into two stacks, those showing more than 50 wells for the year and those with fewer than 50. This separation is made because we receive replies representing a much larger percentage of completions by large operators than by small companies and individuals.

Replies at midyear from 50-and-over group show that 63% of the companies had cut drilling programs for the year, and 37% had added wells.

Plans for wildcat drilling showed slightly different revisions but with the same general trend. Operators with reduced wildcat budgets accounted for 57% of total replies. Those with increases represented 29% of the total, and 14% reported no change in plans.

In the group of smaller companies, 53% reported a reduction in drilling plans for total wells, 26% had increased the number of wells scheduled for the year, and 21% showed no change.

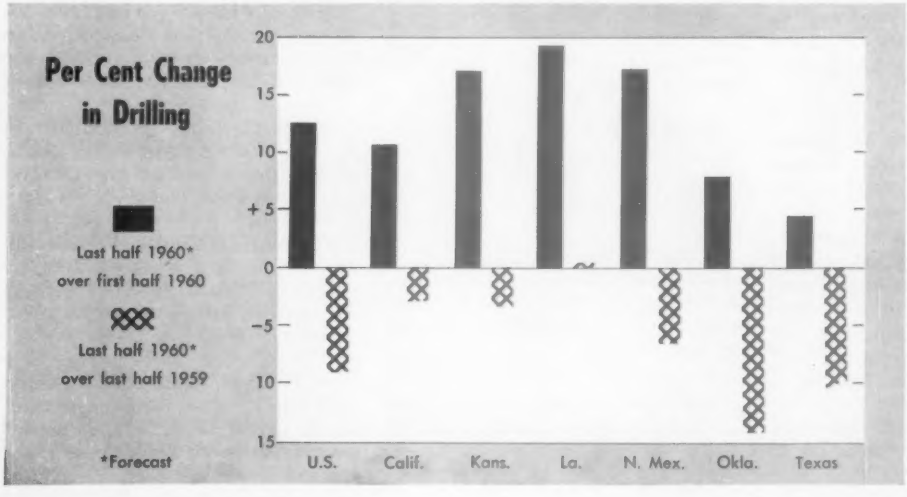
Out of this same group, 39% had cut the number of wildcat wells to be drilled, 31% had increased wildcats, and 30% showed no change.

Back to the large-operator group, total 1960 wells scheduled by these companies at midyear represented a decrease of 2.53% from original plans reported at the first of the year. Even this reduction is not quite typical for the group. If we take out three companies with large upward revisions, the others show an average cut of 6.8% in drilling plans.

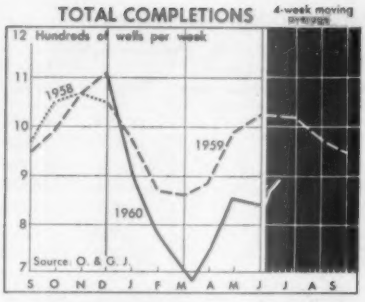
Reports from the under-50-well operators show a downward revision of 10.46% in planned completions. The Journal's midyear forecast shows a cut of 10.48%.

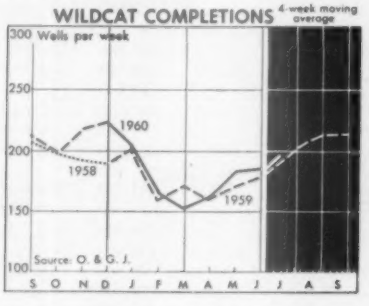
A quick look at the highlights . . .

	LATEST WEEK	Change from WEEK AGO		Change from YEAR AGO	
Production	6,812,000	DOWN	17,000	DOWN	48,000
Crude stocks	258,903,000	DOWN	4,227,000	DOWN	11,385,000
Completions	945	UP	26	DOWN	70
Refinery runs	8,257,000	DOWN	23,000	DOWN	355,000
Gasoline stocks	197,241,000	DOWN	4,061,000	UP	7,382,000
Kerosine stocks	29,157,000	UP	402,000	UP	925,000
Distillate stocks	121,427,000	UP	4,697,000	DOWN	7,925,000
Residual stocks	43,013,000	UP	334,000	DOWN	11,256,000
Four-product stocks	390,838,000	UP	1,372,000	DOWN	10,874,000
Total imports	1,419,200	DOWN	272,700	UP	174,500



DRILLING plans for all important producing states call for more wells completions in the last half than in the first. For the country as a whole the gain will be about 12.8%. But, last-half completions may be as much as 9.2% below the total reported for last half of 1959.





Active Rotary Rigs

	7-18-60	7-11-60	7-20-59
Alabama	2	3	9
Alaska	5	5	(†)
Arkansas	12	13	16
Arizona	0	0	1
California	83	84	96
Land	79	79	91
Offshore	4	5	5
Colorado	31	29	50
Florida	2	3	1
Land	2	3	0
Offshore	0	0	1
Illinois	37	39	41
Indiana	7	7	8
Iowa	0	0	2
Kansas	110	112	140
Kentucky	5	5	5
Louisiana	302	291	376
North	45	44	43
S. Inland waters	115	111	153
S. Land	86	82	121
Offshore	56	54	59
Maryland	1	1	0
Michigan	45	37	28
Mississippi	54	56	71
Missouri	1	1	1
Montana	22	24	24
Nebraska	26	26	24
Nevada	0	0	0
New Mexico	106	102	94
New York	0	0	1

	7-18-60	7-11-60	7-20-59
North Dakota	17	17	28
Ohio	5	4	5
Oklahoma	167	167	247
Oregon	0	0	11
Pennsylvania	11	8	2
South Dakota	0	0	0
Texas	570	566	776
S. Inland waters	5	6	9
S. Land	183	177	191
Offshore	1	1	0
North	54	53	154
Panhandle	31	34	(*)
East	49	49	(*)
West Central	156	150	271
West	91	96	151
Utah	33	36	30
Washington	1	0	1
West Virginia	5	4	10
Wyoming	70	70	98
Total U. S.	1,730	1,710	2,196
Western Canada	173	143	157
Eastern Canada	1	1	0
Grand total	1,904	1,854	2,353

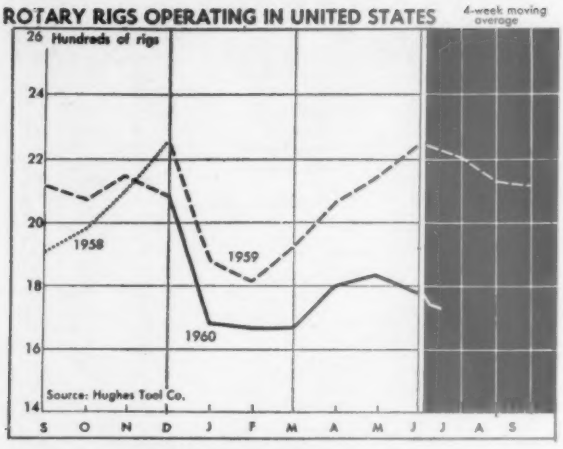
Hughes Tool Co. report. *Included in North. Comparisons not available due to change in method of reporting. †Data first reported 4-4-60.

WEEKLY WELL COMPLETIONS . . . WEEK ENDED JULY 16, 1960

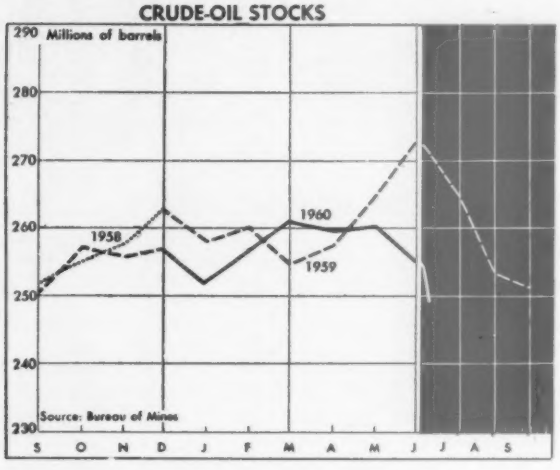
	Total wells							Cum.		Total wildcats					Cum.	
	Total	Crude	Cond.	Gas	Dry	Service	Footage	1960	1959	Total	Crude	Cond.	Gas	Dry	1960	1959
Alabama	0	0	0	0	0	0	0	27	54	0	0	0	0	0	1	11
Arizona	0	0	0	0	0	0	0	10	.....	0	0	0	0	0	10	.....
Arkansas	7	3	0	0	4	0	26,424	332	457	3	1	0	0	2	87	77
California	84	67	0	3	14	0	345,032	842	824	8	0	0	2	6	147	198
Colorado	8	0	0	3	5	0	31,936	333	396	6	0	0	2	4	164	232
Illinois	50	12	0	0	26	12	106,076	1,081	1,137	9	1	0	0	8	239	183
Indiana	24	3	0	0	21	0	28,740	510	431	11	0	0	0	11	197	143
Kansas	55	31	0	2	21	1	187,362	1,748	2,133	18	2	0	0	16	571	487
Kentucky	22	2	0	8	12	0	40,425	854	1,350	1	0	0	0	1	101	87
Louisiana	67	30	4	4	29	0	509,765	1,862	1,924	8	1	0	0	7	291	243
North	27	13	0	3	11	0	100,981	667	690	3	0	0	0	3	137	96
South	32	11	4	1	16	0	331,474	915	1,021	5	1	0	0	4	135	138
Offshore	8	6	0	0	2	0	77,313	280	213	0	0	0	0	0	19	9
Michigan	21	7	0	0	12	2	69,465	433	326	5	0	0	0	5	121	79
Mississippi	11	5	0	0	6	0	107,333	384	339	6	1	0	0	5	138	160
Montana	6	2	0	0	4	0	27,610	162	167	4	1	0	0	3	76	56
Nebraska	28	8	0	0	20	0	155,412	450	452	15	2	0	0	13	181	190
New Mexico	31	15	0	6	10	0	169,098	997	1,027	8	0	0	0	8	157	121
West	10	1	0	6	3	0	56,606	324	469	3	0	0	0	3	38	37
East	21	14	0	0	7	0	112,492	673	558	5	0	0	0	5	119	84
New York	8	0	0	3	5	0	36,325	187	149	5	0	0	1	4	26	13
North Dakota	7	5	0	0	2	0	43,546	164	283	1	0	0	0	1	40	57
Ohio	27	11	0	8	6	2	74,285	549	527	4	0	0	1	3	31	14
Oklahoma	79	29	2	11	30	7	331,261	2,119	3,212	12	0	1	1	10	411	467
Pennsylvania	66	12	0	28	5	21	210,958	377	311	0	0	0	0	0	8	5
South Dakota	0	0	0	0	0	0	0	16	.....	0	0	0	0	0	6	.....
Texas	285	119	22	16	124	4	1,228,602	8,628	10,413	74	3	2	2	67	1,749	1,930
Dist. 1	10	5	0	1	4	0	26,286	574	630	3	0	0	0	3	217	172
Dist. 2	16	8	1	3	4	0	106,867	411	434	1	0	0	0	1	99	125
Dist. 3	17	8	2	2	5	0	117,331	659	625	3	0	1	0	2	121	130
Dist. 4	16	1	6	0	8	1	119,291	588	711	4	0	1	0	3	170	173
East	28	17	2	0	9	0	134,152	691	621	5	0	0	0	5	142	124
Dist. 7-B	50	15	1	5	29	0	147,819	1,240	1,450	22	1	0	2	19	357	386
West	68	38	7	0	21	2	329,039	2,308	3,217	7	0	0	0	7	357	422
Dist. 9	65	23	1	0	40	1	170,450	1,598	1,984	29	2	0	0	27	247	338
Dist. 10	15	4	2	5	4	0	77,367	559	741	0	0	0	0	0	39	60
Utah	8	6	0	0	2	0	46,586	145	177	1	0	0	0	1	47	48
West Virginia	32	6	0	25	1	0	66,378	429	406	0	0	0	0	0	4	11
Wyoming	18	8	0	0	10	0	69,840	548	493	6	0	0	0	6	221	168
Misc. (Florida)	1	0	0	0	1	0	12,525	76	64	1	0	0	0	1	70	33
Total U. S.	945	381	28	117	370	49	3,924,984	23,263	27,052	206	12	3	9	182	5,094	5,013
Previous week	919	434	15	86	349	35	3,761,038	.....	.....	183	17	3	9	154	.....	.....
Cum. 1960	23,263	10,895	701	1,898	9,086	683	101,302,306	.....	.....	5,094	448	56	169	4,421	.....	.....
Cum. 1959	27,052	13,794	665	1,954	9,921	718	111,554,459	.....	.....	5,013	498	72	148	4,295	.....	.....
Western Canada	42	18	0	5	18	1	241,458	1,135	1,321	16	0	0	4	12	322	399

PRODUCTION

ROTARY RIGS OPERATING IN UNITED STATES



CRUDE-OIL STOCKS



CRUDE-OIL STOCKS BY STATES OF ORIGIN*

(Thousands of barrels)

	7-9-60	7-2-60	7-11-59
Pennsylvania	2,123	2,133	2,472
Other Appalachian	1,779	1,717	2,026
Illinois, Indiana, Michigan	9,736	10,050	9,747
Nebraska and North Dakota	2,766	2,864	2,816
Kansas	9,312	9,670	10,262
Oklahoma	17,609	18,063	16,543
Arkansas	2,049	2,067	2,260
Louisiana	17,876	18,892	19,303
North	3,045	3,244	3,283
South	14,831	15,648	16,020
Mississippi, Alabama, Florida	1,634	2,147	2,528
New Mexico	8,200	8,335	7,956
Texas	103,973	105,770	117,185
East Texas	8,372	8,529	9,061
West Texas	47,470	47,695	56,994
Texas Gulf	17,516	17,893	19,475
Other Texas	30,615	31,653	31,655
Wyoming	17,720	17,851	15,475
Other Rocky Mountain	9,762	10,132	9,766
California	28,486	29,062	32,308
Foreign	†16,095	15,923	19,641
Total	**249,120**	254,676	270,288

*Bureau of Mines. †Includes 4,254,000 bbl. in California.

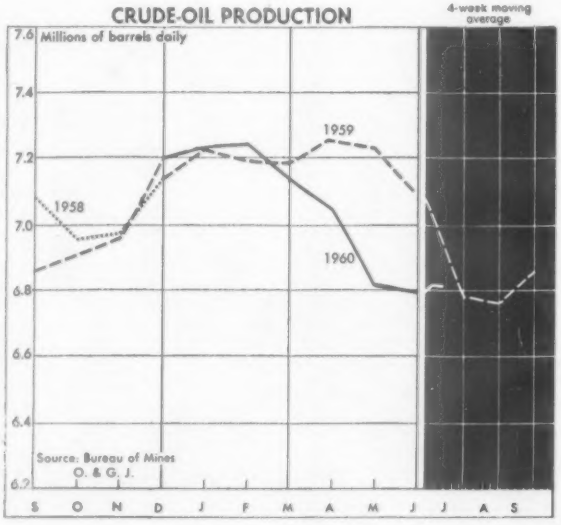
AVERAGE DAILY PRODUCTION FOR WEEK

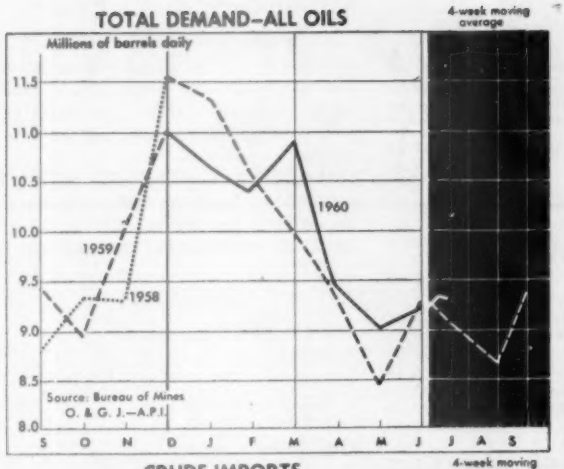
	July 16, 1960 Crude oil	July 16, 1960 Lease condensate	July 16, 1960 Total	July 9 total
Alabama	17,800	.....	17,800	17,775
Arkansas	78,535	115	78,650	78,600
California	836,600	.....	836,600	835,700
Colorado	128,500	.....	128,500	126,800
Eastern	40,800	.....	40,800	41,600
Florida	1,000	.....	1,000	1,000
Illinois	214,500	.....	214,500	212,200
Indiana	32,500	.....	32,500	32,400
Kansas	†283,575	.....	†283,575	†288,120
Kentucky	62,400	.....	62,400	63,400
Louisiana	943,600	118,200	1,061,800	1,061,650
North	107,600	5,700	113,300	113,150
South	836,000	112,500	948,500	948,500
Michigan	41,500	.....	41,500	41,500
Mississippi	134,000	3,600	137,600	137,600
Montana	84,100	.....	84,100	80,400
Nebraska	66,900	.....	66,900	68,700
Nevada	100	.....	100	100
New Mexico	284,000	7,000	291,000	291,000
North Dakota	57,800	.....	57,800	58,900
Oklahoma	†504,300	.....	†504,300	†517,100
Texas	2,349,000	85,800	2,434,800	2,434,800
District 1	41,000	2,500	43,500	43,500
District 2	97,000	8,100	105,100	105,100
District 3	310,000	36,000	346,000	346,000
District 4	161,000	17,000	178,000	178,000
District 5	26,000	300	26,300	26,300
District 6	101,000	8,900	109,900	109,900
East Texas field	122,000	.....	122,000	122,000
District 7-B	126,000	150	126,150	126,150
District 7-C	116,000	3,300	119,300	119,300
District 8	949,000	7,000	956,000	956,000
District 9	193,000	1,700	194,700	194,700
District 10	107,000	850	107,850	107,850
Utah	97,900	.....	97,900	98,600
Wyoming	336,800	.....	336,800	339,700
Others	‡1,350	.....	‡1,350	‡1,350
Total U. S.	6,597,560	214,715	**6,812,275**	6,828,995
Change from prev. week, down	.....	.....	**16,720**	.....
Canada	†477,400	.....	†477,400	†486,300

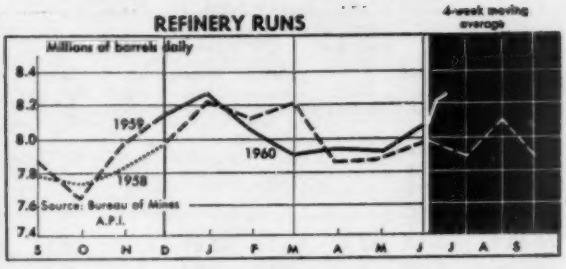
Total U. S. Prod.-Jan. 1-July 16 ..... 1,390,273,200 bbl.
Same period last year (crude plus cond.) ..... *1,410,872,400 bbl.

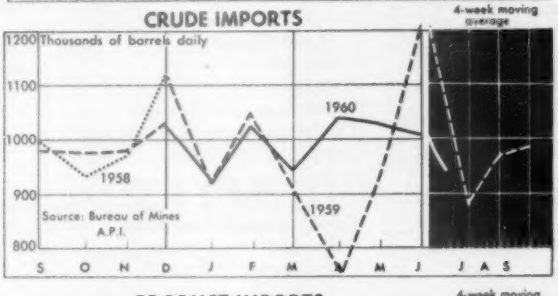
*Includes 37,395,300 bbl. condensate. †Week ended previous Monday. ‡Alaska and South Dakota.

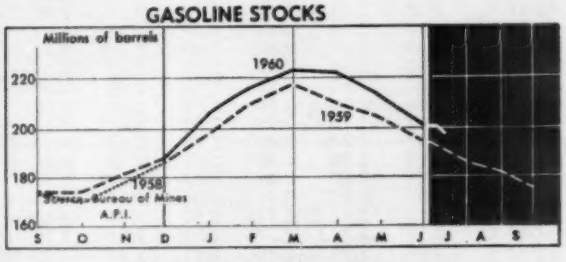
CRUDE-OIL PRODUCTION

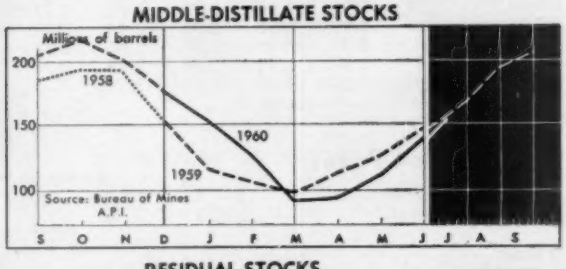


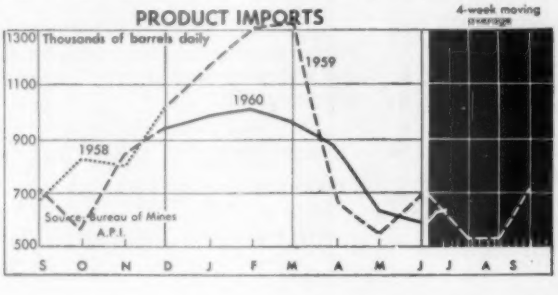


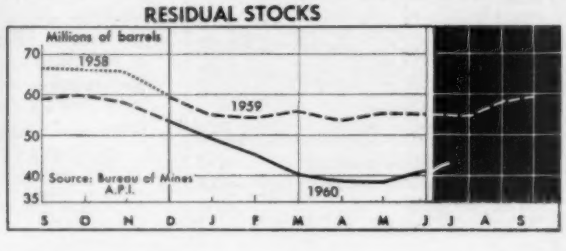












API REFINERY REPORT—JULY 15, 1960

(Thousands of barrels)

District—	Daily avg. runs	Daily average production Gaso.*	Kero.	Dist.	Resid.	Stocks‡ Gaso.†	Kero.	Dist.	Resid.	Bureau of Mines, July 1959 Daily avg. runs	Daily average production Gaso.*	Kero.	Dist.	Resid.
East Coast	1,170	561.0	37.3	374.4	154.7	45,267	11,082	42,995	12,508	1,101	522.0	13.3	325.6	160.0
Appalachian:														
District 1	97	42.3	2.6	23.1	7.1	6,059	679	2,691	430	92	40.8	3.0	21.5	4.2
District 2	107	56.1	1.1	22.4	9.0	2,985	322	1,248	260	107	59.5	1.1	20.5	8.3
Ind., Ill., Ky....	1,450	790.1	68.7	295.1	131.4	35,056	5,818	21,458	5,266	1,413	737.5	68.5	282.6	119.8
Minn., Wis., Dak.	125	59.9	4.0	33.1	16.3	6,693	1,401	5,365	597	115	55.5	7.7	26.5	11.1
Okla., Kans., Mo.	731	396.3	19.7	166.6	19.3	17,948	1,525	10,071	1,066	709	386.8	11.5	166.3	18.5
Inland Texas ...	290	224.7	6.1	51.0	18.4	6,465	490	1,752	2,486	294	229.6	6.6	49.3	24.8
Texas Gulf Coast	1,948	999.2	107.6	440.9	124.1	24,093	3,179	13,578	4,539	1,737	914.2	56.5	405.9	127.8
La. Gulf Coast.	688	374.1	55.9	143.1	51.7	10,556	2,109	5,449	1,605	712	395.2	47.2	166.2	44.7
N. La. and Ark.	104	67.6	5.1	21.6	4.4	5,258	654	2,108	142	69	28.5	1.8	14.0	4.2
Rocky Mountain:														
New Mexico..	30	17.0	1.0	5.4	3.1	652	37	125	9	27	13.8	0.5	5.2	2.3
Other	312	138.1	3.6	73.1	35.9	5,884	335	2,428	904	327	144.8	3.1	67.3	35.1
West Coast	1,205	563.7	40.0	203.3	253.2	30,325	1,526	12,159	13,201	1,178	547.7	3.9	167.8	262.1
July 15, 1960.	8,257	4,290.1	352.7	1,853.1	828.6	197,241	29,157	121,427	43,013	7,881	4,075.9	224.7	1,718.7	822.9
July 8, 1960.	8,280	4,382.4	383.6	1,864.4	863.7	201,302	28,755	116,730	42,679	.....	.....	.....	.....	.....
July 17, 1959.	7,902	4,028.7	226.4	1,806.7	933.4	189,859	28,232	129,352	54,269	.....	.....	.....	.....	.....

*At refineries including natural blended. †Finished and unfinished. ‡At refineries, bulk terminals, in transit, and in pipelines.

Crude-Oil Prices

GRAVITY SCHEDULE

	Signal Hill, Calif.	Okla-homa	West Tex. (sour)	West Tex. (Inter.)	No.* Texas	Texas Refugio Light	Bayou Sale (La.)	Denver Jules-burg	Wyo. (sour)
14-14.9	$1.76	....	....	....	....	....	....	....	....
15-15.9	1.84	....	....	....	....	....	....	....	$1.81
16-16.9	1.92	....	....	....	....	....	....	....	1.86
17-17.9	2.00	....	....	....	....	....	....	....	1.91
18-18.9	2.08	....	....	....	....	....	....	....	1.96
19-19.9	2.16	....	....	....	....	....	....	....	2.01
20-20.9	2.24	$2.49	$2.35	$2.61	$2.29	$2.95	$2.90	$2.58	2.06
21-21.9	2.32	2.52	2.38	2.63	2.33	2.97	2.92	2.60	2.11
22-22.9	2.39	2.55	2.41	2.65	2.37	2.99	2.94	2.62	2.16
23-23.9	2.46	2.58	2.44	2.67	2.41	3.01	2.96	2.64	2.21
24-24.9	2.53	2.61	2.47	2.69	2.45	3.03	2.98	2.66	2.26
25-25.9	2.60	2.64	2.50	2.71	2.49	3.05	3.00	2.68	2.31
26-26.9	2.67	2.67	2.53	2.73	2.53	3.07	3.02	2.70	2.36
27-27.9	2.74	2.70	2.56	2.75	2.57	3.09	3.04	2.72	2.49
28-28.9	2.81	2.73	2.59	2.77	2.61	3.11	3.06	2.74	2.54
29-29.9	2.87	2.76	2.62	2.79	2.65	3.13	3.08	2.76	2.59
30-30.9	2.93	2.79	2.65	2.81	2.69	3.15	3.10	2.78	2.63
31-31.9	3.00	2.82	2.68	2.83	2.73	3.17	3.12	2.80	2.67
32-32.9	3.06	2.85	2.71	2.85	2.77	3.19	3.14	2.82	2.71
33-33.9	3.12	2.88	2.74	2.87	2.81	3.21	3.16	2.84	2.75
34-34.9	3.17	2.91	2.77	2.89	2.85	3.23	3.18	2.86	2.79
35-35.9	3.22	2.94	2.80	2.91	2.89	3.25	3.20	2.88	2.83
36-36.9	3.27	2.97	2.83	2.93	2.93	3.27	3.22	2.90	2.87
37-37.9	3.31	2.99	2.86	2.95	2.95	3.29	3.24	2.92	2.89
38-38.9	....	3.01	2.89	2.97	2.97	3.31	3.26	2.94	2.91
39-39.9	....	3.03	2.92	2.99	2.99	3.33	3.28	2.96	2.93
40-44.9	....	3.05	2.95	3.01	3.01	3.35	3.30	2.98	2.95

*Cooke, Grayson, Montague.

Flat Prices

Louisiana:
- Sweet Lake $3.00

Texas:
- East Texas 3.05-3.25
- Conroe 3.23-3.53
- Van 3.08

Pennsylvania Grade:
- Bradford $4.70
- Middle District 4.52
- Southwest Pennsylvania ... 4.25
- West Virginia 4.07
- Buckeye Grade 3.98

Illinois Basin **2.85-3.00**

Foreign

Middle East, Persian Gulf (cargoes f.o.b. lifting port):
- Arabian, about 34°, Ras Tanura $1.90
- Iranian, 34.0°-34.9°, Bandar Masur 1.86
- Iranian, 34.0°-34.9°, Abadan 1.81
- Iraq, 36.0°-36.9°, Fao 1.82
- Kuwait, 31.0°-31.9°, Mina-al-Ahmadi 1.67
- Qatar, about 41°, Um Said. 2.05

Middle East, E. Mediterranean:
- Arabian, about 35°, Sidon.. 2.29
- Iraq, about 35°, Tripoli, Banias (Grade A) 2.29

Far East (cargoes, f.o.b. Lutong, Sarawak):
- Seria Light, 37° 2.57

Canada:
- Leduc-Woodbend $2.53
- Redwater (Alta.) 2.42
- Smiley (Sask.) 2.18
- Pembina 2.38

Venezuela:
- Cumarebo, 47°-47.9°, Tucupido 3.34
- San Joaquin, 40°-40.9°, Puerto La Cruz 3.08
- Oficina, 35°-35.9°, Puerto La Cruz 2.80
- Tia Juana medium, 26°-26.9°, Amuay* 2.30
- Quiriquire, 16.0°-16.4°, Caripito 2.10
- Lagunillas heavy, flat, Las Piedras* 2.10
- Bachaquero, flat, 15°-16°, Las Piedras* 1.88

Prices for all crudes of 24° or lighter vary 2 cents per degree change, up or down. All crudes heavier than 24° vary 2.5 cents per half-degree gravity change.

*Also available at La Salina at 3 cents per barrel less.

Tanker Rates (Long Ton)

(Latest reported spot fixtures)
- ★ Gulf-NY, clean (ATRS—12.5%) $2.49
- ★ Carib.-NY, dirty (ATRS—57.5%) 1.17
- ★ PG-Japan, dirty (USMC—77.5%) 2.30
- ★ PG-UK, dirty (Scale—65.5% (22s. 9d.) . 3.19

★Denotes change from previous week.

Refined-Product Prices

Following quotations are realistic spot prices for refined products moving interstate on Wednesday each week. They may differ from refiners' posted prices and should not be considered as postings.

Light-product prices are in cents per gallon. Residual and crude prices are dollars per barrel. Crude prices are at the well unless otherwise listed.

Gasoline*

Mid-Continent (Group 3):
- Regular (91 octane).. 11.75-12.00
- Premium (99 octane). 14.50-14.75
- Natural gasoline (26-70) 4.5
- Breckenridge 4.0

Gulf Coast (cargoes for coastwise or export movements):
- ★ Regular (90 octane) .. 10.75
- ★ Regular (92 octane) .. 11.00
- ★ Premium (98 octane). 12.00

California (rack) Los Angeles:
- Regular (88 octane) .. 11.65-12.15
- Premium (94 octane). 12.65-13.15
- Premium (100 octane) 14.00-14.65

Caribbean area (cargoes):
- Regular (87 octane) .. 10.00
- Premium (97 octane).. 11.625

*Quotations are for octanes shown. Prices usually vary with octane ratings within the regular, premium, and aviation grades.

Kerosine and Distillate

Mid-Continent (Group 3):
- Kerosine 42-44 ..... 9.25
- Diesel oil (58 d.i. and above) 9.00
- Distillate No. 1 ..... 9.00
- Distillate No. 2 ..... 8.00

Gulf Coast (cargoes):
- Kerosine 41-43 ..... 9.00-9.25
- Distillate No. 2 ..... 8.25

New York Harbor (barges):
- Kerosine 41-43 ..... 10.05
- Distillate No. 2 ..... 9.05
- Diesel fuel, 48-52 d.i. 9.35

Caribbean area (cargoes):
- Distillate No. 2 ..... 8.125

Residual Fuel (Bbl.)

Mid-Continent (Group 3):
- Residual fuel (max. 1% S) $1.90

Gulf Coast (cargoes):
- ★ Bunker C fuel 2.35

New York Harbor (barges):
- Bunker C fuel 2.52

Caribbean (cargoes):
- Bunker C $2.10

California (rack):
- Bunker C fuel, Los Angeles $2.15

★Denotes change from previous week.

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LIQUIDATION

at ESSO REFINERY Balto., Md.

TOWERS

10'	x 145'—125 PSI	50	trays
9'6"	x 121'—325 PSI	30	trays
8'6"	x 103'—165 PSI	24	trays
7'0"	x 82'— 75 PSI	30	trays
6'0"	x 80'—300 PSI	30	trays
4'0"	x 44'—150 PSI	12	trays
3'6"	x 36'—400 PSI	12	trays
2'6"	x 52'—360 PSI	22	trays
2'2"	x 57'— 85 PSI	4	trays

HEAT EXCHANGERS—CONDENSERS

Steel Tube ..... 7,500 to 100 sq. ft.
Adm. Tube ..... 3,500 to 236 sq. ft.
Cu Ni Tube ..... 2,330 to 308 sq. ft.
S. S. Tube ..... 1,000 to 170 sq. ft.

BLOWERS—11,880 CFM @ 11 PSIG
INSTRUMENTS—Controllers, Recorders, Indicating and Transmitting
MOTORS—10 HP to 500 HP XP
PIPE CHROME—3¼" to 14" OD
PUMPS—Hot Oil, Steam, Centrifugal
REACTOR—8' x 32'6" OA
REBOILERS—2,700 to 450 sq. ft.
TRANSFORMERS—5 KVA to 333 KVA
VALVES—Diaphragm, Butterfly Slide and Pressure Regulating
VESSELS PRESSURE—3' to 12' Dia.

PETRO CHEM FURNACE
1.9 MILLION BTU NEW 1949

WRITE FOR COMPLETE CATALOG

HEAT & POWER CO. INC.
60 East 42nd St., New York 17, N.Y.
310 Thompson Bldg., Tulsa 3, Okla.
Box 5203, Baltimore 24, Maryland

FOR SALE EQUIPMENT

PACKAGED WORTHINGTON two stage compressor. Like new—used four months. Size compressor cylinders 8" x 11" and 12" x 11" with LeRoi L-3000 engine. Complete with Happy two stage gas cooler, Vargo engine speed controller, Masonilan pressure controller and automatic lubricator oiling system. Price $22,500.00. Alvin Johnson, Phone 6661, Oil City, Louisiana.

BAILEY BRIDGES
Portable Prefabricated
BAILEY BRIDGE
RENTALS & EQUIPMENT
P. O. Box 753,
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FOR SALE

2,000 ft. 24" O.D. new spiral weld.
.250 wall . . . 63.41# per ft. Plain end.
B. F. W.—prime—50 ft. lengths.
Wire, write, or phone

COLUMBUS STEEL SUPPLY
1000 BONHAM AVE. • AX 4-4461
COLUMBUS, OHIO

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62 MILES OF 6-inch pipeline with booster pumping station sites and recorded rights of way, extending from Philadelphia refining area to a point 7 miles north of Lancaster, Pennsylvania. 44 miles are presently in product use and remainder can be returned to use after repairs. Box L-913, The Oil and Gas Journal, Tulsa, Oklahoma.

Stops corrosion problems in refineries, oil fields, distribution equipment, filling station underground pipe installations, etc. Write for details. Free sample. GALV-WELD PRODUCTS, Dept. OGJ, P. O. Box 1303, Bradenton, Florida.

LIQUIDATION
at Koppers Co.—Monaca, Penna.
Oil Cracking Plant—1949

TOWERS, 14 ft. to 99 ft.
EXCHANGERS, 75 sq. ft. to 6,370 sq. ft.
CENT. PUMPS, 5 to 4,000 GPM
FURNACES, Petroleum, Alcorn and B & W types.
TANKS, 500 to 850,000 gal.
VALVES, from 1" to 18" Forged Steel, Approx. 3,000 to 4,000
COMPRESSORS, Ingersol-Rand, steam, type XPV.
INSTRUMENTS, Foxboro, Leeds & Northrop.

(FOR SALE—as a plant or by item. Contact Rochester-Coal-Trucking & Contracting Company)

Rochester Coal
Trucking & Contracting Company
1999 Beaver Road, Monaca, Pa.

FINAL CLEAN-UP SALE

DESTREHAN, LA.

HEAT EXCHANGERS

Steel Tube: 3280, 2100, 1200, 950 sq. ft.
Adm. Tube: 2800, 2700, 2600, 2100, 1700, 1500 1373, 1250, 1100, 1000, 920, 650 sq. ft.
20 Fin Tubes: 50-190 sq. ft.

VESSELS & TOWERS

8' x 75' 20 Tray 25#
7½' x 56' 20 Tray 35#
36' x 58' 30 Tray 154#
3' x 47' 20 Tray 120#
18" x 32' 15 Tray 130#
2' x 30' packed 30#
4' x 36' packed 210#
10' x 55' 60#
8' x 43' 60#
6' x 42' 200#
6' x 20' 40#
12' x 43' 25#

2—IR Turbo Exhausters 15,300 & 17,000 CFM 4.85 PSIG with Turbine Drives.
1—Clark Centrifugal Compressor 10,000 CFM—240 PSI discharge.

STORAGE TANKS & SPHERES

15 Storage Tanks welded: 29,000, 10,000, 5,000, 3,750 barrel.
5 Spheres-Spheroids: 5,000, 10,000 barrel.

PUMPS

Hot Oil: 1" through 6"; 50-400 gpm 100-3,000 ft. hd.
Boiler Feed: 190 gpm 1,500' hd.
Cooling Tower: 7,000 gpm 120' hd.
River Water Sump: 1,000 gpm 59' hd.
Deep Well: 1,700 gpm 90' hd.

OTHER FEATURED ITEMS

1 Lummus: 35 mil. BTU furnace
2 Petro-Chem. Furnace: 1¼ mil. BTU
2 B&W Boilers: 70,000# per hr.-450#
1 IR-XVG-4 Compressor
1 Worth LT-6 Compressor
1 Ethyl Lead Plant

WIRE!—PHONE! FOR COMPLETE INFORMATION

BRILL EQUIPMENT COMPANY—DESTREHAN, LA.—NORCO 6571
4101 San Jacinto St. Houston 4, Texas, JA 6-1351
35-65 Jabez St. Newark 5, N. J., MA 3-7420

FOR SALE EQUIPMENT

FAILING 1,500 long mast kellys. K. C. Franks number 5 x 6 pump. Others. 3¼ inch hexagon kellys, $125. Fred E. Butler, Box 481, Pueblo, Colorado.

TWO PERFORATING trucks with lines completely equipped with or without radioactivity logging equipment. These trucks are in excellent condition and ready for immediate use. Box L-897, The Oil and Gas Journal, Tulsa, Oklahoma.

BARGAIN: Franks double drum portable drilling rig w/200,000# capacity 90' derrick, 7¼ x 12 G D Pump and all necessary tools for complete rotary rig inventory on request. Miers Well Service Inc., Box 325, Sterling, Colorado.

FOR SALE in excellent condition 8,353 ft. 3½" OD 13.30 grade D drill pipe with 3½" Hydril IF double boxes and twin pin subs; 1,896 ft. 3½" OD 13.30# grade D drill pipe with 3½" Hughes flush joints tool joints, w/lift plugs. System Oil & Gas Company, Meadows Building, Dallas Texas, Telephone EM 8-2202.

WELL DRILLS, core drills. Everything for well and core drilling. New and used equipment at money saving prices. Everything in supplies. Nationwide sales. Send for bulletins—Pressey & Son, Pueblo, Colorado.

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2,000,000 ft.	2"	3.50# to the ft.
1,000,000 ft.	3"	7.70#
1,000,000 ft.	4"	10.98#
500,000 ft.	6"	19.80#
200,000 ft.	8 5/6"	28.#
400,000 ft.	10¾"	35.#
75,000 ft.	12¾"	40.#
10,000 ft.	16"	42.#

All No. 1 Grade plain end and cleaned.

INDIANA-OHIO PIPE CO.
P. O. Box 5412 Shop. Sta.
Columbus 19, Ohio
Phone CL 3-5527

NEW CROLOY 5 HEATER TUBES

Priced at ½ New Cost

Must Move at Once

14—3¼"	x ⅜" wall x 44' long
63—4"	x ¾" wall x 26' long
10—4"	x ¾" wall x 32' long
50—4"	x ½" wall x 32' long
3—5"	x ½" wall x 42' long
42—6"	x ½" wall x 27' to 47' long

HEAT & POWER CO., INC.
60 E. 42nd St., N. Y. 17, N. Y.
310 Thompson Bldg., Tulsa 3, Okla.

FOR SALE EQUIPMENT

FOR SALE on bid basis—one operating gas plant and pipe line system, Magnolia, Arkansas, daily capacity approx. 23 MMCF, 90,000 gallons. Contact Shell Oil Company, Mr. O. H. Hanyka, Magnolia, or H. B. Grist, Express 1331, New Orleans, Louisiana.

PLATFORM TYPE power drilling rig, 14,000 ft. capacity for sale on a bid basis at Morgan City, Louisiana. Rig unitized for quick move. Contact Shell Oil Company, W. L. Brady at Morgan City, or H. B. Grist, Express 1331, New Orleans, Louisiana.

FOR SALE—Model 33C Walker Neer service and drilling unit, mounted on International tandem truck, 140 HP Waukesha engine, heavy duty 8" 65' double mast, 4000' ⅞" drilling line, 5,000 ½" sand line, 400' ¾" casing line, steel dog house, light plant mounted on truck and some light drilling tools. Machine and truck in first class condition has drilled very little new hole. One and one half years old and will sell for less than half of its cost. P. L. Crandell Company, 1404 Wilco Bldg., Midland, Texas.

NEAR NEW National 110 Rig with three PTDS-8 Engines, Gyrol Drive, "Runaround" Rotary Drive, two taildriven G-700 National Pumps, C-250 Pump with GMC-Power, 142' L. C. Moore 1,025,000# Mast, National "F" Hook-Block #654F450, National N-815 Swivel, National MS-27½ Table, M-D Recording Indicator with Sensator and Torque Gauge, Six Bender Drill Pipe Bins and Racks, Casing Racks, 28 Drill Collars, one 410 Bbl. Storage Tank, two 35 KW Generators, Utility House with Panel with C-H "Arc-Tite" Connections. Shop with 5,000 gallon Diesel Tank Mounted Topside, Tool House 20' x 7'6" x 10' Skid Mounted, 7'6" x 7'6" x 7'6" Drillers House, Totco, Casing Tools, Misc. Tools, etc.
Rig located at Southeastern U. S. Port on Dock. Six months total use, Drilled three wells since new. Excellent Condition and Priced to Sell. Contact E. W. Clark, c/o Bender Oil Operations, P. O. Box 52, Bakersfield, California. Telephone FAirview 4-4961.

185' DRILLING BARGE

Single hull slotted drilling barge, 185' x 38' x 12', with derrick substructure, reserve mud tanks, slush sand settling pits, deck fuel and water tanks, tool house and change locker house. Built 1950. Barge has Deckard all-galvanized derrick flood windbreak for 136' Emsco 18 ARH-1 derrick; rig and mud line manifold and associated equipment; Mid-Continent engine substructure, 3 sections, each 19'4" long x 7'4" high x 7' wide; Mid-Continent engine house, 36'6" long x 19'4" wide, and shed-type roof.
Barge is docked at Humble's slip on the Harvey, Louisiana canal and is offered for sale on an as-is, where-is basis. Inspect by contacting Mr. W. O. Foster at Humble's office on the Intracoastal Canal at Harvey.
Bids must be mailed to Westbrook Teer, Humble Oil & Refining Company, P. O. Box 2180, Houston 1, Texas. Bids must be received prior to 9:00 AM, September 1, 1960. Humble reserves the right to reject any and all bids.

HUMBLE OIL & REFINING COMPANY

FOR SALE EQUIPMENT

3 APP. 100 H.P. Oilfield Firebox Type Steam Boilers insurable for about 200 to 225#. Excellent condition. Bargain $1,500.00 each F.O.B. our yard. Write or Phone M. KAPLAN & SON, INC. Monroe, Louisiana. Fairfax 2-5112.

TWO REDA PUMPS for 5½" casing complete with control panels, No. 4 cable and protecters. One with transformer and generating unit. For additional information contact Tennessee Gas Transmission Company, Box 163, Great Bend, Kansas.

MAYHEW 1000 DRILL UNIT

air-water combination mounted on 1955 R185 International truck. Also includes water truck with 700-gallon tank. Call or write:

Mr. John Nelson
Continental Geophysical Co.
P. O. Box 35501, Dallas 35, Texas
Phone: FLeetwood 2-2671.

1 12" Series 900 G.K. Hydril B.O.P. Packing Unit—New
1 12" Series 900 S.S. Cameron B.O.P.

Both Excellent Condition
Sellers name & address available through
Box L-921, The Oil and Gas Journal, Tulsa, Oklahoma

EQUIPMENT WANTED

WE ARE interested in the purchase of your depleted wells for salvage. Also, used casing, tubing, units, tanks, etc. Must be in Kansas area. The Buckeye Supply Company of Kansas, Inc., 105 S. Main, El Dorado, Kansas.

HELP WANTED

PETROLEUM ENGINEER—with production experience and sales ability, wanted by Houston Production Equipment Manufacturer. Box L-892, The Oil and Gas Journal, Tulsa 1, Oklahoma.

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SALES MANAGER

Young, Outgoing, Aggressive,

For A Superlative New Product Fibre Glass-Epoxy Pipe and Tubing For a Wide Range of Pressures For Oil Production and Chemical Industries.

Box L-906,
The Oil and Gas Journal,
Tulsa, Oklahoma.

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Realistic Rates—Attractive Purchase Option

N-4 BREWSTER "Bobtail" torque converter rig complete. Draw works powered by two Waukesha 6WAK engines. With G-D 7¼" x 12" unitized pump powered by LeRoi 12-cylinder engine, 93' Lee C. Moore mast on 6½' substructure, BJ hook, Brewster block, swivel and rotary table, vibrating shale shaker, Regan blowout preventer, nine drill collars, 5600' of excellent 4" O.D. drill pipe. With necessary piping, fittings and accessories. Located at Oklahoma City.

133' IDECO "Full View" mast on 8' high x 46'10" long substructure, with steel flooring, stairways and accessories. Located at Odessa, Texas.

Also other drilling and production equipment for rent or term lease.

LUCEY

LUCEY PRODUCTS CORPORATION
624 So. Cheyenne Tulsa 19, Oklahoma
Phone: LUther 4-4711
Oklahoma City—Woodward, Oklahoma • Dallas—Odessa, Texas

HELP WANTED

NATURAL GASOLINE PLANT ENGINEER

Oil Company has immediate need for a qualified man with chemical and/or mechanical engineering degree. Require at least five years experience in all phases of natural gasoline plant operation and treatment of sour gas. Duties involve general plant engineering including laboratory control testing, plant performance tests, plant maintenance, and process trouble-shooting. All inquiries held confidential. Please send resume of background and experience to Box L-818, The Oil and Gas Journal, Tulsa, Oklahoma.

PROCESS ENGINEER WANTED by national manufacturing concern to locate in Tulsa area. Engineering degree required. Should be experienced in gas, gasoline plant layout. Write stating qualifications, experience, salary desired, etc. Box L-915, The Oil and Gas Journal, Tulsa, Oklahoma.

CONSULTING ENGINEERING Firm with offices in U. S. and Canada has an opening for a young personable engineer, which offers opportunity for advancement. B.S. in chemical engineering and five years experience in gas processing industry minimum requirements. Advanced degree preferred. Knowledge of production or marketing problems in oil industry helpful. Permanent location Calgary, Alberta. Starting salary commensurate with experience and ability. Send resume of experience, salary requirements, and picture. Box L-920, The Oil and Gas Journal, Tulsa, Oklahoma.

FOREIGN EMPLOYMENT—foreign drilling superintendents, workover tool-pushers, cable tool drillers, rig mechanics. Also, refinery personnel, administrative and supervisory. Key Employment, 711 Main, Houston, CApitol 5-0727.

Expanding petro-chemical company has several opportunities for qualified technical graduates or production men with several years experience in chemical plant operation for responsible supervisory positions. Please send resume including salary requirements, educational background, and experience to
P. O. Box 109 Marshall, Illinois

MECHANICAL ENGINEER

Graduate mechanical engineer with a minimum of five years process industry experience in various phases of mechanical engineering. Send detailed resume of experience, education and salary requirements to:

Personnel Manager

NATIONAL COOPERATIVE REFINERY ASSOCIATION
Box 770, McPherson, Kansas

PLANT FIRE MARSHALL

Expanding oil company has created new position of Fire Marshall to take charge of its fire protection program at refinery and terminals in Perth Amboy, New Jersey, area. Duties will include fire training, supervision, inspection and equipment testing. Applicant must be at least a high school graduate, possess leadership qualities, have a good working knowledge of fire fighting and prevention techniques, with particular respect to oil and other flammable liquids, and have an intimate knowledge of appropriate fire fighting equipment. Age to 40. Salary commensurate with background and ability. Forward full resume and salary requirements to:

Personnel Manager
Hess Trading & Transport, Inc.
Box 200, Port Reading, N. J.

HELP WANTED

NEW OIL JOB Directory, foreign and domestic, showing where to apply for jobs. 500 selected producing, refining, butane and pipeline companies. Nationwide, $5.00 cash. OIML Co., Box 2603, Tulsa, Oklahoma.

OFFICE MANAGER for Tulsa office and warehouse for established firm dealing in piston rings and packing. Internal combustion Engine experience desired. Engineering degree not required. Age preference 30-45. Box 4624, Tulsa, Oklahoma.

SALES PROMOTION ENGR. Must be aggressive, married, willing to relocate. Duties to consist of promotion of rotary rock bits for a growing business in U. S., Canada, Mexico. Must be acquainted with the oil industry, prefer knowledge of Rock Bits also. Send resume and photograph to Gruner & Company, Inc. P. O. Box 911, Ponca City, Oklahoma. Replies will be kept strictly confidential.

SITUATIONS WANTED

PETROLEUM GEOLOGIST, B. S. University of Texas. 10 years major and independent experience. Subsurface and completion in Julesberg, Williston, Mid-Continent, two years recently in Kentucky. Age 35. Will relocate. Box L-899, The Oil and Gas Journal, Tulsa, Oklahoma.

CHEMICAL ENGINEER. 19 years experience in petroleum engineering and multi-functional planning work, last 7 years in supervisory managerial posts, desires responsible position petroleum or petrochemical company. Write: Box L-863, The Oil and Gas Journal, Tulsa, Oklahoma.

GEOLOGIST-PALEONTOLOGIST

B.S. degree in Geology, 20 years major and independent oil company experience in geology in the U. S. Mid-Continent, California, South America, and the Middle East, familiar with micropaleostratigraphy, depositional environments, well correlations by lithology, foraminifera, ostracoda, pollen and spores, residues, all types of well logs, geologic and magnetic surveys, ideas for drilling wells, wants retainer.
216 Knox Building Enid, Oklahoma

SENIOR EXECUTIVE

Private corp., 38, married, LLB, seeks position with aggressive independent oil company, desiring overseas expansion. Exp. negotiations, concession agreements, business practices Europe, Africa, Middle East. Have knowledge of areas available, some with local financial participation. Personal resume on request.
Box L-900, The Oil and Gas Journal, Tulsa, Okla.

Exploration and valuation engineer, age 52. B.S. Geology and petroleum engineering. 30 years active diversified oil & gas field experience, all phases of geology, exploration, drilling production construction & reservoir engineering. 10 years at management level with large independent oil company, desires position with well financed independent aggressive oil or gas company or investment group to screen submittals anywhere western hemisphere preferred. Can assist with financial associates where justified, active experience California, Montana, New Mexico, Utah, Colorado, Wyoming & Texas. Excellent health and references. Box L-923, The Oil and Gas Journal, Tulsa, Oklahoma.

SITUATIONS WANTED

MATERIALS CONTROL AUDITOR. Nine years oil company experience. Age 36. Will relocate. Thomas Crowe, 5307 So. Detroit, Tulsa.

EXPERIENCED GEOLOGIST. Desires to represent active independent on retainer or salary in Ark., La., Tex., area. Over 9 years well rounded major company experience. Hard worker. Resume furnished. Available now. Box L-922, The Oil and Gas Journal, Tulsa, Oklahoma.

THIS GEOLOGIST can bring you a record of keeping costs down—efficiency up—during 8 years solid petroleum experience in wellsite operations, basin and facies studies, trap finding. Organized and supervised field and laboratory operations for majors. MS, 32, married. Can you use a fresh approach to revitalize your operations? Write for details Box 31 R 791, The Oil and Gas Journal, 4041 Marlton Ave., Los Angeles 8, Calif.

BUSINESS OPPORTUNITIES

FINANCIAL—Investment Banking Houses and Underwriters reached. Confidential. You can send the details of your proposition direct or thru your attorney to Consultant 817—81st Street, Brooklyn, N. Y.

HOLDING COMPANY
needs
AGGRESSIVE CONTRACTOR—DEVELOPER
for
ASSOCIATE
to
handle
REAL ESTATE DEVELOPMENT
and
Contract work
Investment of $200,000.
Secured by Parent Company
Wire or phone
Norman S. Brooke, vice president

Guardian Trust Company
Montreal
Victor 2-8251

The City Public Service Board of San Antonio, Texas

REQUESTS PROPOSALS TO FURNISH FULL REQUIREMENTS OF NATURAL GAS

The gas is to meet requirements for distribution to customers through the City of San Antonio Gas Distribution System and for use in the steam-electric generating plants of the City Electric System, deliveries of gas to commence on or about April 1, 1962.

Estimates of annual requirements, load factor data, points of delivery and other pertinent data may be secured from:

O. W. Sommers,
General Manager
Navarro and Villita Streets
P. O. Box 1771
San Antonio 6, Texas

REAL ESTATE

MEXICAN RANCHES—Two 20,000 acre ranches west of Saltillo, Coahuila State, about 150 miles from border. Good title, $3.50 per acre, suitable for cattle or recreation. Box L-895, The Oil and Gas Journal, Tulsa, Oklahoma.

RANCH FOR SALE

$20,000 DOWN BUYS northern Wyoming's finest cow outfit. Three miles from Buffalo, Wyoming at the foot of the Big Horn mountains, 200 acres irrigated, good water rights, modern two bedroom home, school bus. Owner financed.

CLAIR ROBINSON
MU 4-2431 Buffalo, Wyoming

LEASE AND DRILLING BLOCKS

GULF COAST, TEXAS Oil Company interested in acquiring proven leases in upper Gulf Coast area for drilling program. Send complete information to Box L-916, The Oil and Gas Journal, Tulsa, Oklahoma.

TWO TEXAS oil leases available: Crane County, S/239 acres, Section 18, block B-28, PSL; Upton County, all section 6, block 2½, TC RR survey, 77 acres; bonus priced $10.00 per acre, with $1.00 per acre annual delay rental, five years primary term leases, subject to my confirmation. Quickly write landowner: Jefferson G. Smith, 715 Littlefield Building, Austin 15, Texas.

LINCOLN CO., KENTUCKY—677 acres Jumbo section, production corniferous—175' to 300'. Older field nearby has produced for many years. One of Kentucky's shallowest fields. Oil Development Co., 1836 Euclid Avenue, Cleveland 15, Ohio.

WILDCATTERS: THIS IS IT! WALNUT, FALKNER, OWL CREEK STRUCTURE, four sites for 1,500 ft. oil. Eminent geologist's report. $2.00 acre reliable operators ONLY. SHALLOW OIL. 1369 Court, Memphis 4, Tennessee.

PROSPECTIVE OIL Land: Suitable townsite acreage in fee, E/35 acres, Sec. 16, Block JKL, PSL Survey, Hudspeth County, Texas, at intersection U. S. Highway 62 and F. M. 1437 Highway, South of Dell City, Texas. Write quickly, Jefferson G. Smith, 715 Littlefield Building, Austin 15, Texas.

759 ACRES ALLEN and Monroe Counties, Kentucky, available for sublease, assignment or drilling contract. Phone 6572, or write: Box 697, Oil City, Louisiana.

DRILLING DEALS available Cambridge arch area of Nebraska. All based on subsurface geology. 10 to 12 possible pays. Economics excellent. Major company support on many. William V. Wade, Consulting Geologist, Box 772, McCook, Nebraska.

FOR SALE—working interest in 160 acres offset to nice Bartlesville Sand, well 750 ft. Eastern Kansas. Box L-902, The Oil and Gas Journal, Tulsa, Oklahoma.

KENTUCKY—4,000 acres Pulaski County, $1.00 cash per acre, $1.00 oil payment per acre from ⅛. 10 year term leases 25 cent rental paid to January 1961. Assign all or any part. Investigate today. Write, wire, phone: W. V. Cravens, Russell Springs, Kentucky.

FOR SALE several thousand acres leases in Deep Edwards trend Texas. Scout Box 2274 Houston, Tex.

PROVEN GAS RESERVES

Newly discovered gas field. Market nearby, suitable for storage. Interested purchasers may write for complete information. Box L-887, The Oil and Gas Journal, Tulsa, Oklahoma.

FINANCING

CAPITAL WANTED

Unique opportunity available to individual or corporation for investment in oil and natural gas properties. Box L-914, The Oil and Gas Journal, Tulsa, Oklahoma.

BUSINESS SERVICE

DELAWARE CORPORATIONS formed and serviced. American Guaranty & Trust Company, P. O. Box 487, Wilmington, Delaware.

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PRODUCING PROPERTIES: Highest price paid for producing properties, including stripper production. Tex-Gas-Oil Investment Co., Inc. 601 Meadows Building, Dallas, Texas, Phone: Em 3-1693.

WANTED TO PURCHASE OIL PAYMENTS OR ROYALTIES

Also will consider purchase of working interest in good shallow drilling prospects.

The Matador Oil Corp.
966 Moraga Dr.
Los Angeles 49 Calif.

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(including company)
and

(2) your NEW address

We need them both to make the change. Also confirmation of your company connection and position.

The Oil and Gas Journal

Box 1260 Tulsa, Okla.

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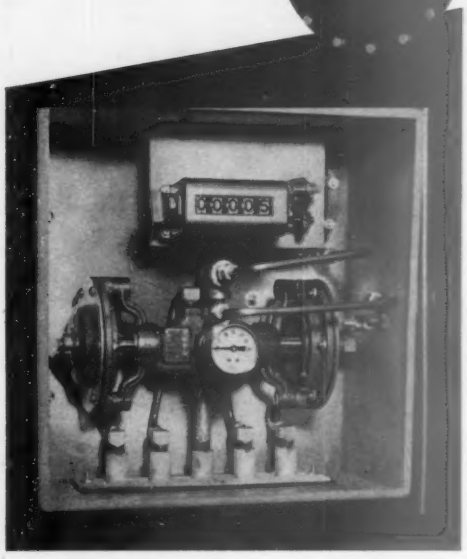

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